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Plastic pollution and circular economy in Sweden

A case study of two Swedish plastic recycling companies

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Abstract

Plastic as material has become ubiquitous in modern life and it is difficult to imagine a world without it. Since the proliferation of plastics on the consumer market in the 1950s, poor waste management and low recycling rates have resulted in overflowing landfills and leakage into nature. This has led to a myriad of disastrous consequences, both ecological and environmental, which researchers are continuing to learn more about as the problem grows ever more impending. To have a fighting chance at reversing these trends, a circular approach to the plastic life cycle needs to be put into action. The purpose of this study was to gain a better understanding of the obstacles to a circular plastics economy for Swedish recycling companies. In order to achieve the purpose, a case study with semi-structured interviews of two Swedish companies was conducted. The results were analyzed with theories, previous literature and relevant initiatives. In conclusion, the results indicate that obstacles are manifold, with the biggest challenge existing on the consumer side. Producer demand, technical, design and regulatory obstacles were also a factor, although improvements in these areas are being made and are likely to play a lesser role in the future.

Keywords: Sustainability, plastic pollution, circular economy, plastic recycling, Sweden.

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1. Introduction

The following chapter will provide an introduction to the study by discussing the necessary contextual background to the research problem. After that, the problem analysis will be discussed. Moreover, a section on the contribution to the literature will be presented followed by the purpose and the formulated research question. Finally, the chapter concludes with a brief account of the boundaries that have been set for the study.

1.1 Background

Plastic as material has become ubiquitous in modern life and it is difficult to imagine a world without it. Humans have grown to become dependent on the incomparable versatility of this material. Plastic is an excellent thermal and electrical insulator, it is highly durable and has the property of being molded or pressed into almost any solid shape, which makes it unparalleled by any other competing material. The endless application of plastic is the primary factor for its popularity and explains its rapid increase in utilization (Andrady & Neal, 2009). When plastic was first manufactured for commercial use in the 1950s, the practicality of the material was so evident from the beginning that it greatly contributed to the increase in its use to become a staple in manufacturing processes. As Freinkel (2011) puts it, “In product after product, market after market, plastics challenged traditional materials and won, taking the place of steel in cars, paper and glass in packaging, and wood in furniture” (p. 4). However, despite the indispensable benefits that plastic's unique properties continue to provide humanity, there has historically been a serious neglect in the proper management of plastic waste (UNEP, 2021). In response, there has been a strong backlash against this negligence in recent years, which has led to a change in the public's view of plastic consumption (Buranyi, 2018). Ethical considerations are rapidly playing an increasing role in consumer decisions and even act as a driving force in their consumption patterns. Notions, such as that convenience is a good reason to ignore the negative consequences of one's own purchasing decisions, are being challenged (Accenture, 2020). As a change in consumers' consciousness develops further, the future of plastics is brought into question as it is increasingly being associated with pollution and environmental harm (Bassetti, 2020).

However, despite this, the production and consumption of plastic continues to grow around the world, with estimates that in 2050, global cumulative production of plastic waste will have reached 34 billion tonnes; more than tripling the production in 2017 (Geyer, 2020). Furthermore, as more plastic is expected to be produced and released into circulation in the near future, concerns are growing about the prospect of alarming levels of pollution as a result of poor waste management leading to catastrophic effects on the climate and various ecological processes (Thompson et al., 2009). So far, only a fraction of plastic waste has been recycled, with most ending up in overflowing landfills or leaking into the environment (Geyer et al., 2017). Today, plastic pollution is recognized as a global impending problem which threatens to pose an existential risk to the environment if left unchecked by disrupting ecological processes and even going so far as to pose a serious threat to human health and well-being (Thompson et al., 2009).

Biodiversity and specifically the oceans have long fallen victims to being dangerously polluted by the improper handling of plastic waste. In a new report commissioned by the World Wide Fund for Nature (WWF), the most comprehensive review to-date of the literature on marine plastic pollution revealed that the projected growth in plastic production, even if cut today, will have a number of disastrous ecological consequences as a result of the almost impossible task of cleaning up plastic once it has entered the oceans (WWF, 2022). The looming threats are expected to trigger a cascade of complications due to hazardous concentrations of microplastics¹ accumulating in the environment, such as a reduction in the biodiversity of species, similar to a mass extinction event. Moreover, the exponentially rising curve for pollutants that leak into the oceans is so steep that by 2050 there will be more plastic in the oceans than fish by weight (WEF, 2016). However, it is also critical to understand that humans are not isolated or removed from the consequences of their own actions. For example, pollutants released into the environment through human activity, such as macroplastics² breaking down into microplastics in oceans and on land, lead to approximately nine million premature deaths each year, making it the leading environmental cause of disease in the world (Landrigan et al., 2020; see also Fuller et al., 2022).

¹ Microplastics are tiny (diameter < 5 mm) fragments of plastic that can penetrate tissue and accumulate, for example through indigestion, in the bodies of many organisms (Lim, 2021)

² Although a standardized definition is missing, macroplastic is generally regarded as debris with a diameter \geq 5 mm (Lechthaler et al., 2020)

Furthermore, a recently published study revealed for the first time that microplastics have been detected in human blood and that the microparticles can travel around the body, which makes scientists wonder whether they can even reach the brain (Leslie et al., 2022). Moreover, another revelatory study found that microplastics were clogged deep in the lungs of living humans in almost all the samples included in the analysis (Jenner et al., 2022). Although the specific implications of these findings for human health are still being investigated, there is already an abundance of evidence growing that makes a causal link between chronic exposure to microplastics and hormonal changes leading to a host of alarming health complications such as: endocrine disruption, male reproductive toxicity and decreased testosterone (D'Angelo & Meccariello, 2021; Jin et al., 2022).

In the end, the key to reversing the decades-long trend of improper and inadequate handling of plastic waste is to have a proactive approach, one that takes into account the many factors that have enabled the problem to arise in the first place and to encourage cooperation between all responsible stakeholders to act in unison, “Targeting the causes of plastic pollution is far more effective than cleaning up afterwards. If governments, industry and society act in unison now, they can still limit the plastic crisis” (Vesper, 2022, sixth paragraph). Needless to say, the amount of scientific evidence that has emerged in recent years, which has sounded the alarm of the dangerous trajectory the world is heading towards has been enormous and has put governmental bodies on high alert.

From a global perspective, the United Nations (UN) recently succeeded in persuading UN member states to endorse, what has now been called, a landmark resolution at the UN Environment Assembly (UNEA-5). The Assembly reached a historic moment when they agreed to endorse a global legally binding resolution to stop plastic pollution, which they hope to reach an agreement on by 2024. The resolution contains an important provision for recognizing microplastics as a form of plastic pollution, and for emphasizing marine pollution as an explicit cause for concern (UNEP, 2022).

From a regional perspective, Sweden has historically taken a leading position and played an important role in being an early adopter with regards to sustainable initiatives for dealing

with environmental issues (Heidenblad, 2021; see also Ahlberg, 2009). Specifically, the producer responsibility obligation, which was legislated January 1st 1994 in Sweden, is a system tool that prompts producers to bear the responsibility of the impact of their own products (Lindén et al., 1999). Producers must seek to produce products that are designed to be easily recycled, free of environmentally hazardous substances and that are resource efficient. Packaging is one type of product that is covered by a producer responsibility, meaning that the producer of a plastic packaging product has to bear the costs of awareness-raising measures as well as collection and clean up of the product in the public systems (Naturvårdsverket, n.d.a.). In 2020, the Swedish government introduced a tax on the production of plastic bags³ (Finansdepartementet, 2020). The tax is part of the government's work to achieve Sweden's environmental goals and also the EU's consumption goals for plastic bags. The tax has led to a marked change in consumers to refrain from buying plastic bags; sales of plastic bags are declining as consumers are instead choosing to buy paper bags or other substitutes (Romson et al., 2022). Finally, in recent years it has become increasingly popular to carry tote bags, and for some the popularity of tote bags can be explained by the fact that it has grown into a symbol of self-expression and environmental activism (Santana, 2022).

1.2 Problem analysis

The production of manufactured goods has hitherto been arranged around the traditional linear view of economy which is characterized by a perpetual cycle of take-make-dispose flow. A linear economy holds no inherent concern for the consequences of its ecological footprint, relegating the task of acting in accordance with a sustainable responsibility to a secondary cause, or an afterthought, over the prioritization of financial profit. As a result of linear economies being sustainably ineffective, even counterproductive by the lack of a right framework to deal with sustainability issues, an alternative view of the traditional model, which incorporates sustainability into its core structure, has taken prominence over the years (MacArthur, 2013). A circular economy is a business model that seeks to reduce waste, reuse resources and recycle materials in the manufacturing process to increase cost-savings and

³ Other notable initiatives in Sweden to promote recycling and waste reduction includes the deposit system called pant; which encourages consumers to recycle cans and plastic bottles in the supermarket for monetary compensation (Pantamera, n.d.)

improve resource efficiency (Stahel, 2016). A circular economy can be described with three simple principles: Firstly, it takes into account the elimination of waste and pollution by using durable materials and thus avoiding waste. Secondly, products and materials should circulate. The materials and products used must be ready to be reused or repaired to avoid ending up in a landfill as waste. Finally, the restoration of nature is also an important point. To preserve nature, it is required to take advantage of the resources available and take care of the earth's climate. With circularity, what in a linear economy is generally treated as waste can instead be handled in a sustainable way to refurbish a product, extend the lifespan of a product or give it a second life in the form of a new product (MacArthur, 2013).

With the Sustainable Development Goals⁴ (SDGs), the UN has been outspoken about the importance for a shift in the consumption and production patterns of humans towards a more sustainable prospect. In accordance with SDG 12, “Responsible consumption and production”, the UN states that “Sustainable consumption and production is about doing more and better with less [...] It is also about decoupling economic growth from environmental degradation, increasing resource efficiency and promoting sustainable lifestyles” (United Nations, n.d.a, fifth paragraph). Furthermore, the pressure from legislators and policy makers has increased in recent years. For example, in 2015, the European Union (EU) approved its first action plan, funding solutions and other measures to help make the transition to a circular economy within the EU more efficient (European Commission, n.d.a.). In 2018, the plan was expanded and the EU Circular Economy Package contained considerable opportunities for companies that can position themselves at the forefront of sustainable change (Clarke, 2019).

In line with this, the Swedish government is working to implement measures to advance the transition to a circular economy and has set up an action plan, consisting of four focus areas, that will spearhead the transition: “sustainable production and product design”, “sustainable consumption of products and services”, “circular and non-toxic product cycles” and “circular economy as a driving force for promoting innovation and circular business models” (Government Offices of Sweden, 2020).

⁴ SDGs are 17 global goals that are part of the UN's Agenda 2030 for sustainable development (UN, 2020)

Although a circular plastics economy benefits the environment, there are difficulties with plastic recycling. Hopewell et al. (2009) describes that there are different types of plastics at the molecular level. This creates a problem when manufacturing new plastic products because you can only blend certain types of recycled plastic without disrupting the quality of the virgin plastic. For example, a PET⁵ (Polyethylene terephthalate) bottle requires a type of recycled plastic that does not contain PVC⁶ (Polyvinyl chloride) as this can reduce the quality of the bottle. This means that even if plastics are recycled, it can be difficult to reuse all plastics if they do not meet the requirements to ensure that the new manufactured product maintains its quality. Moreover, the problem of whether recycled plastic can actually reach the same quality as virgin plastic⁷ is further discussed by Hopewell et al. (2009). The authors describe that even if you blend recycled plastic with virgin plastic, the quality of the plastic will differ in one way or another, as it can affect the color, strength and clarity. The outcome depends on the purity of the recycled plastic and the functional requirements for which the new recycled product is to be intended. Furthermore, the authors argue that you must design plastic correctly starting with the manufacturer of the virgin plastic and additionally increase and improve the sorting of different plastic types so that rejection waste is reduced (Hopewell et al., 2009).

However, Kantai (2020) is highlighting another perspective on plastic recycling. The study shows that when plastic is exposed to heat, its chemical composition changes. To recycle plastic, you must expose it to heat. That being said, plastics can only be recycled a number of times before the material becomes useless for reuse, but still retains its characteristics so that it does not degrade completely. As a conclusion the author claims that investments in manufacturing virgin plastic is the main issue. Unless the production of virgin plastic is slowed down, there is ultimately no point in the efforts to recycle plastic (Kantai, 2020).

To illustrate the value chain of plastic waste recycling, Figure 1 shows how plastic material goes through several different stages when recycled (Figure 1).

⁵ PET is the most common of all plastic materials worldwide and its use can be seen in a variety of applications such as: liquid bottles, food containers and in fibers for clothing (De Vos et al., 2021)

⁶ PVC is a very common, although highly controversial type of plastic. Its use has come under heavy scrutiny by researchers who believe it to be carcinogenic (Brandt-Rauf et al., 2012)

⁷ Virgin plastic, unlike recycled plastic, has not been subjected to earlier use or undergone the processes of chemical treatment for the purpose of recycling (Ellen MacArthur Foundation, 2021)

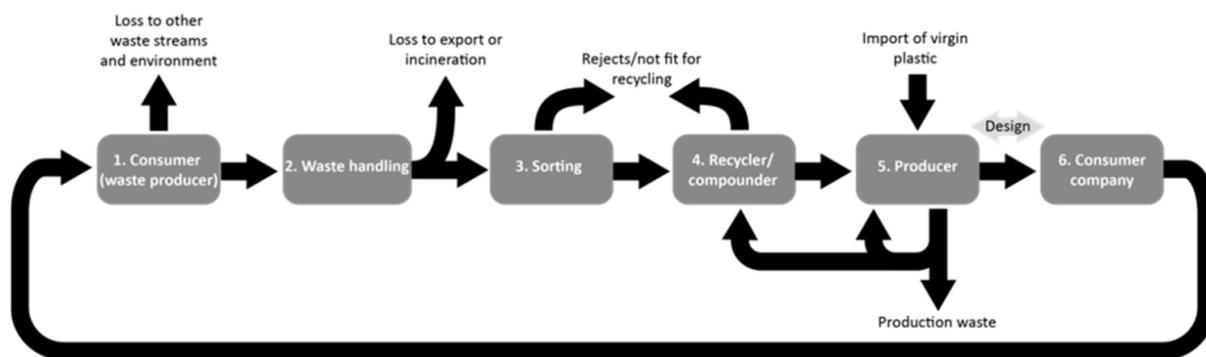


Figure 1. Value chain of plastic waste recycling. The value chain consists of 6 stages binded by black arrows showing the direction of plastic material movement and out- or inflow to/from the environment. Plastic recycling in the Nordics: A value chain market analysis. From *Waste Management* (Volume 76., p. 180-189), by L. Milios et al. 2018, Elsevier. Reprinted with permission.

Stage 1, Consumer, stands for a consumer who has turned plastic packaging to waste. Based on how the consumer handles the waste, it enters stage 2, Waste handling, where the waste is handled by moving to stage 3, Sorting. In stage 3, the waste is either rejected and incinerated, if it is not suitable for recycling, or moved towards stage 4, Recycler. When the packaging is recycled it moves to stage 5, Producer, where it is diluted with an input of virgin plastic to produce a new plastic product. It then moves to stage 6, Consumer company, where it is sold to consumers and the value chain repeats (Milios et al., 2018).

1.3 Contribution to the literature

This study aims to map what obstacles exist to circular plastic recycling in Sweden, through a case study with semi-structured interviews of two Swedish companies, Svensk Plaståtervinning and Trioworld. As far as the authors of this research are aware, this study examines an area that has not been investigated before on Swedish plastics recycling actors. This is seen as an explorative approach that contributes to essential and crucial information about the problem. The findings of this study is expected to contribute to a deeper understanding of the obstacles, opportunities and future trajectory of circular plastics recycling in Sweden.

1.4 Purpose

The purpose of this study is to better understand the obstacles to circular plastics recycling and manufacturing of recycled plastic products for companies in the Swedish recycling industry.

1.5 Research question

To fulfill the purpose of this study, the following research question has been formulated:

- ❖ What are the obstacles to a circular plastics economy for Swedish recycling companies?

1.6 Delimitations

This study will not limit itself to the investigation of a particular type of plastic, it will instead examine plastic in general. Moreover, the study will be limited geographically to the plastics recycling industry in Sweden.

2. Theoretical framework

This chapter will begin with a literature review of three existing theories: stakeholder theory, triple bottom line and private public partnership theory. These have been selected to understand the underlying reasons why it can be difficult for companies to make decisions according to stakeholders' wishes, how private and public organizations can cooperate towards a common goal and how companies can measure their social and environmental impact. Therefore, the selected theories provide a relevant basis for the purpose of the study. Then, a description of sustainability and circular economy will be presented. After that, the chapter will discuss initiatives on sustainable plastic management taken by the European Union.

2.1 General theories

2.1.1 The triple bottom line

According to Elkington (1998), the triple bottom line, also referred to as TBL, is an instrumental tool that provides an accounting framework for companies to measure their environmental, economical and social value. TBL attaches great importance to how the social and environmental impacts are as important as the financial gains when monitoring performance for long term profitability. The triple bottom line is further broken down into the following three P:s which focuses on the social and environmental impacts of a company:

- ❖ *People*: variables such as employees, communities and suppliers that are referred to as a company's most important stakeholders. To measure the variable employees, the variable well-being is used.
- ❖ *Planet*: refers to the company's environmental impacts such as carbon emissions, pollution and waste management. It is used to measure the current impacts and monitor the development with the aim to decrease the negative impacts, such as reforestation or waste management.
- ❖ *Profit*: contains impacts on international, national and local levels. This is measured with variables such as how much wealth a company generates for the community, if it increases employment and economic growth etcetera. It is not about how much the

company generates but its economical impacts on, for example, the local communities and its prosperity.

The indicators for today's use of the triple bottom line are similar to Elkington's idea. Land disturbance, fairness, greenhouse gas emissions, employment generation and more are used for monitoring performance for the three dimensions of sustainability development. The indicators are often used when monitoring locally (United Nations ESCAP, 2015).

However, Milne and Gray (2013) argues that TBL is a deeply problematic framework that sets barriers upon the ecological systems. They conclude that corporations often report that they are claiming to be moving towards sustainability basing this on frameworks as TBL, but these claims however are in fact moving towards levels of un-sustainability. Milne and Gray believe that the United Nations Environmental programme should change its perception of sustainability to its earlier ecological conception. Laying out demands on reformation of business models and industries that are unsustainable should be re-framed (Milne & Gray, 2013).

2.1.2 Stakeholder theory

According to Wicks et al. (1994), stakeholders refer to people who affect the company's welfare such as customers, suppliers and employees. Donaldson and Preston (1995) highlights the importance of explaining the characteristics and behaviors of the company to the stakeholders to build legitimacy by being transparent. Although it is an advantage to include stakeholders' opinions in decision-making (Donaldson & Preston, 1995), a problem can arise around it. Jensen and Sandström (2011) argues that companies can not take everyones opinions into account. There are no clear directives for how decision-making should take place, thus the management can make decisions that go hand in hand with the stakeholders' opinions if it benefits them or that companies make decisions at the expense of stakeholders or other actors.

Additionally, Hillman and Keim (2001) argues that competitive advantage, sustainability and stakeholder value are factors that influence each other. However, there are issues with the stakeholder theory. Jensen (2002) argues that it rests on a fundamentally flawed premise, that

an organization must have a single objective function, in this case to include stakeholders. For a firm to survive and be competitive, it must include the objective of value maximization and in conjunction with the stakeholder theory, the proper relation of both is described as enlightened value maximization (Jensen, 2002). Hörisch et al. (2014) suggests another way to address the issues of the stakeholder theory. They state that value creation for stakeholders should be based on sustainability, as well as education and regulations, which could solve the issue of the stakeholder theory.

2.1.3 Public-Private Partnership

The public-private partnership theory is described by Bovis (2006) to involve a cooperation between the private and public sector. The cooperation can be a mutual commitment as both can benefit from each other. For example, public and private sectors can cooperate on infrastructure projects and transportation, and also on important issues such as education, health and waste management.

The theory can be divided into contractual and institutional public-private partnership. The contractual part concerns the part where the private sector is assigned a task or is responsible for a specific area allocated by the public sector. Through these assigned responsibilities, contractual contracts are created that connect the private sector with the public sector. The institutional part involves the part where the private sector and the public sector must work together as a unit and ensure that their offered service or work has been delivered to the public and done good. Through these collaborations, private and public organizations can create an institutional public-private partnership that is run by both parties or that the private sector takes over part of the public sector's activities if this is beneficial. Another positive thing about a collaboration between different sectors is that the public sector can get help from private partners that have more experience concerning areas the public sector needs support. If this partner has more experience and can contribute to the public sector, this can benefit the general public and the public sector can still be in control even with support from private organizations (Bovis, 2006). However, difficulties with the public-private partnership theory are whether it can be applied without risking violating a country's regulations (Custos & Reitz, 2010).

2.2 Concepts of sustainability

2.2.1 Social, economical and environmental dimensions

In 1987, the World Commission on Environment and Development (WCED) conducted a report known as the Brundtland report. This report described the term sustainability development as “Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 16). Moreover, sustainability captures three dimensions; the social, economical and ecological. These dimensions are affected by our actions and in the short and long term and which in turn affects the environment and human well-being (Potvin & Richards, 2015). This vision is similar to the triple bottom line (Elkington, 1998).

Furthermore, Goodland (1995) argues that environmental, social and economic aspects are the basis for sustainability. Firstly, environmental sustainability involves increasing the quality of human welfare. That being said, today's generation needs to live by the constraints within the limited resources and not exceed consumption so that future generations are affected by the consequences. Moreover, waste must be avoided and emissions must be kept at controlled levels so that the environment is not harmed. Also, non-renewable resources can not be classified as entirely sustainable and more renewable resources must be offered. Secondly, social sustainability is about identifying how businesses affect humans and try to manage these effects. Social sustainability also deals with the relationship between stakeholders, companies and questions concerning employees of a company, customers and society. An example of things that count as social problems are poverty, unemployment and inequality. Another important issue that concerns social sustainability is human health. Moreover, by working with social issues and social development, it can help businesses to grow. Finally, the third dimension of economic sustainability concerns questions about economic development, but not at the expense of the environment and the social aspect. That being said, natural capital or social capital should not be adversely affected when there is an expansion in economic capital (Goodland, 1995; Spangenberg, 2005).

2.2.2 Circular economy

Many companies have begun to adopt a circular model, however, as Sen et al. (2021) describes, there are difficulties with such an implementation. One of the difficulties in implementing a circular economy is that government regulations are more adapted to a linear economy. With that said, the regulations make it difficult to keep costs down if companies transition to a circular economy. Furthermore, consumers have an impact on why companies find it difficult to transition from a linear to a circular economy. When a circular economy is implemented, the company has smaller stocks of products that are used more intensively, this results in increased costs for consumers as demand can be much greater than supply (Sen, 2021). Moreover, Atkinson and Ezell (2012) argues that innovation is a way to gain advantages and companies that have a more innovative approach have an easier time adapting to change. Furthermore, the authors claim that even if innovation has its advantages, it is not easy to change how a company is structured, for example, introducing new approaches to the company requires a lot of work, resources and time. However, there is also the risk of missing the opportunity for a competitive advantage when choosing not to proceed with an innovation (Barney, 1991; Bates & Flynn, 1995). The European Union is currently taking several initiatives with the purpose to transition the member states towards a more circular economy (European Commission, 2018).

2.3 Initiatives on sustainable plastics management

2.3.1 European Plastics Strategy

In 2018, the European Commission (EC) announced in a press release a strategy for plastic in order to contribute to the transition to a circular economy. This plastic strategy aims to make recycling profitable for companies by making new packaging regulations on the plastic that is on the market and by doing so increase the demand on recycled plastic among other things. This strategy is also contributing to the goal that all the plastic packaging on the European market will be recycled by the year of 2030 (European Commission, 2018).

2.3.2 The Green Deal

At the end of 2019, the EU developed an action program called “The Green Deal”, to solve environmental and climate issues. The purpose of the Green Deal is to create a new

plastic-economy with five aims: “to make material recycling profitable for corporations”, “decrease the amount of plastic waste”, “stop plastic littering in seas”, “promote innovations regarding the use of plastic and investments for this cause” and lastly, “encourage the whole world to do the same by making changes”. The whole life cycle of a product is taken into consideration, beginning with the production to repair and the waste management of plastic products. Recycling and the reuse of existing plastic will permeate the Green deal. A circular economy leads to an increase in the usage of recycled plastic (Utrikesministeriet, 2020).

One of the most important prerequisites for achieving the goals of the Green Deal has been the adoption of the action plan for circular economy, also known as the EU's Circular Economy Action Plan (CEAP). In March 2020, the EC adopted the new CEAP where they state the expectation for the upcoming 20 years that plastic consumption will double. Therefore, it is important to use recycled plastic to a greater extent and to consume plastic more sustainably. This will be pursued by introducing obligatory requisites for waste reduction on products such as packaging. In addition to reducing plastic waste, they will work towards eliminating the occurrence of microplastics. This will be pursued by introducing legislative measures that will address all stages in a products life cycle and thus be able to capture microplastics from accidental releases. The new action plan for circular economy includes a development plan of a whole new framework for bio-based plastics that are biodegradable or compostable. The aspects of bio-based plastics acquisition, labeling and use will be regulated. A further explanation on why bio-based plastics are seen as better than those on the market today, is because they will lead to reduced use of fossil fuels and the fact that bio-based raw materials contribute to environmental benefits (European Commission, 2020).

2.3.3 Plastics own resource

In 2018, the EU commission presented a new reformed system, which is being called *Plastics own resource*, for the EU's own resources, which is a budget financing system of sources of income that mainly finance the EU's expenditures (European Commission, 2018). As of January 1st 2021, additional agreements on changes of the EU budget financing system were made regarding the EU member states own resources. Including a new revenue source of a monthly unitary withdrawal rate of €0.8 per kg of plastic packaging waste from what is

generated in a member state but which is not recycled (European Commission, n.d.b). This implies that Sweden as a member state of the EU has to pay a fee of €0.8 per kg for all the plastic waste that has not been recycled. The main purpose of the plastic waste fee is to encourage the member states to reduce their plastic waste by increasing the recycling rate and thereby lowering the fee costs (European Commission, 2018).

3. Methodology

This chapter will describe the methodological approach to the research. It begins with a justification behind the choice of methodology, followed by a description of the selection of industry, companies and interviewees. Then, an explanation of the data collection procedure will be presented. Finally, the chapter concludes with an account of the reliability, validity and ethical considerations for the research.

3.1 Research design

Since the purpose of this study was to better understand the obstacles to circular plastics recycling and manufacturing of recycled plastic products for companies in the Swedish recycling industry, a qualitative research method was preferable. A qualitative approach includes interviews and literature sources that provide space for analysis and interpretation for a deeper understanding of the subject that is examined. The opposite is a quantitative approach that involves statistics and figures used in empirical research (Patel & Davidson, 2019). In order to answer the research question, a qualitative approach has been chosen to get an analytical and nuanced picture of the issue since it is more effective for this particular end than a quantitative methodological approach (Bryman & Bell, 2017).

The choice of a qualitative methodology creates some limitations for the authors (Patel & Davidson, 2019). Specifically, plastic recycling is a complex subject matter and it can be difficult for the authors to process all information that the research contains. There are different approaches to reasoning and conducting research to connect theory with empirical data. Patel and Davidson (2019) discusses these three options: deduction⁸, induction⁹ and abduction¹⁰. The study highlights an area that has not been researched with Swedish companies as a basis intended to shape theories according to reality. That being said, it could be argued that the scientific approach used in this study is an inductive approach. The research focused on observing individual cases and drawing general conclusions through the theories that can be tested on new cases. One criticism of using either deduction or induction

⁸ Through existing theories hypotheses are created in order to draw conclusions about individual cases (Patel & Davidson, 2019)

⁹ Theories are formed by studying individual cases and reality, also drawing conclusions from what is observed (Patel & Davidson, 2019)

¹⁰ A combination of both deductive and inductive approach (Patel & Davidson, 2019)

is that the author is limited in terms of the data he is allowed to use and can make it difficult to get other angles of the issue if it goes against the selected approach. Also, induction is described as the approach where there is no previous information and where the authors do not sit on information on the subject before. Thus, it can be said that the author's experiences have influenced the choice of subject when deciding on the subject matter before choosing to research it. With that said, one can not build upon a research without any a priori knowledge of the subject, and it can mean that a researcher chooses a subject unconsciously which there are already existing theories about, which can upset the scientific approach (Patel & Davidson, 2019).

3.1.1 Limitations of qualitative studies

Using a qualitative approach is very time consuming and labor intensive for researchers and since qualitative studies do not follow strict rules on how the study is to be carried out, the researchers can use their own interpretations of qualitative methods (Patel & Davidson, 2019). Given that qualitative methods are very much a question of interpretation, the authors own interests and prejudices can influence the conduct of the study, which is a limitation (Anderson, 2010). Furthermore, another limitation was that the interviews were only conducted with one person from each company and this could lead to a wrong image of the company if the interviewee has given incorrect descriptions or has reasons to give answers that do not match what the company as a whole stands for (Bryman & Bell, 2017). Ideally, in order to reduce the risk of using incorrect information as a basis in the study, more interviewees should be included in the study from the same company. However, it was difficult with the time frame and lack of resources to conduct interviews with more people from each company.

3.1.2 Case study

In order to answer the research question a case study was preferable with two interviews from two different companies in the same industry. Using case study in business economics research is common (Bryman & Bell, 2017) and case studies are preferable when studying changes and processes (Patel & Davidson, 2019). Due to the study including two interviews with two companies in the same industry in Sweden, the authors already had a limitation to two selected companies and one industry. Patel and Davidson (2019) describe the problem of

giving a generalized answer when limiting oneself to a particular case, that case studies have difficulty generalizing the result. The result is usually more adapted to specific cases. However, Yin (2011) describes that it is acceptable to draw general conclusions with qualitative studies on similar cases.

3.2 Selection process

The decision behind the selection of industry, companies and interviewees was based on the relevant connection they had to fulfill the purpose of the research and aid the authors in their gathering of empirical data to answer the formulated research question.

3.2.1 Industry

A significant positive impact on the reduction of plastic waste must come by way of an increased recycling rate of plastic (Hopewell et al., 2009). Therefore, a circular approach to plastic waste management is the only solution that can allow us to keep pace with the increased demand for plastic without actually polluting the environment. Nevertheless, there is still room for more research in the plastics recycling industry, as it is an existing problem that is still growing.

3.2.2 Company

For this case study, the research was limited to examining circular plastics recycling in Sweden. Therefore, the companies which were chosen to be included in the interview process had to be based in Sweden, be in the recycling industry and also work to integrate a circular economy in their plastic recycling processes. Both companies met all of the aforementioned criteria for being included in the study.

The first company, Svensk Plaståtervinning, was formed in the mid-1990s as a result of the introduction of the producer responsibility system for packaging in Sweden. Each individual producer could set up such a system, but it would be quite inefficient to have thousands of producers collecting and recycling their own packaging so they merged through a number of different industry organizations and established a separate material company that would help the industry with this task. Furthermore, Svensk Plaståtervinning has historically only been sorting collected plastic waste from households. However, the company is currently working

on a major project to build the world's largest facility for plastic recycling, which they have called Site Zero. Site Zero will allow for an expansion of Svensk Plaståtervinning's operations to also include recycling of plastic whilst being completely carbon neutral (Svensk Plaståtervinning, n.d.). The second company, Trioworld, has its head office and market in Sweden but conducts operations in the Netherlands, France, England and Denmark. The company works with five different divisions that manufacture stretch film, industrial film, healthcare, carrier bags and consumer packaging. Moreover, the company both buys recycled plastics and recycles its own plastics in-house for the manufacturing of their products. Trioworld is a leader in the use of recycled plastic in the production of plastic packaging solutions for their customers worldwide (Trioworld, n.d.). Together, both companies cover the entire plastic value chain; from collected plastic waste, sorting and recycling to the final production of recycled plastic products.

3.2.3 Interviewees

Selecting suitable interviewees was an active choice as the study aims to answer questions that may be difficult for people to answer if they are not experts in the subject area. The interviewees were all experts within their own field. One of the respondents was a Development Engineer and the other respondent was a Sustainability Development Director. The interviewees felt compelled to participate in the interview process based on their understanding of the aim of the research; reasoning that they were qualified representatives from their respective companies to conduct an interview with. The interviewees were the ones who were considered most suitable to answer the interview questions and thus selected for the process.

3.3 Data collection

The basis of all scientific endeavors must rest on the gathering of valid empirical data. For this research, the authors have collected data through an extensive literature review and two semi-structured interviews.

3.3.1 Literature

Based on the subject of this study, relevant theories have been sought to answer the research question, which provided a new input within the chosen subject area (Bryman & Bell, 2017).

In order to obtain a larger theoretical basis for the research question, a literature review of academic articles was used as a foundation for the analysis. The collected literature material is either peer-reviewed or articles of high scholarly standard. Bell et al. (2019) argues that it is preferable to use peer-reviewed research since the content of the research has been verified by scientists within the same research area and it gives the collected material more credibility. Apart from the aforementioned sources, other sources have been included in the research, such as: governmental bodies, international organizations, scientific reports, medical journals and textbooks, which provided a larger base of the collected material and broadened the answers (Bryman & Bell, 2017).

The selected literature was collected through JSTOR as this search base contains primary sources of academic journals and literature, and Google Scholar for its extensive database of scholarly articles from academic publishers. Additionally, materials have been collected via the electronic library University of Gothenburg's "Supersök". In obtaining the selected literature, specific keywords have been used independently and in different combinations. These keywords are: "sustainability", "plastic pollution", "circular economy", "plastic recycling" and "Sweden". These keywords were decided on by getting a bit into the problem formulation and seeing which words were worth emphasizing. The authors strived to reach relevant literature and through these keywords it was possible to identify a good basis for answering the question. By highlighting what is most important in a study and searching for specific keywords, it is easier to filter information and lead the study in the desired direction (Patel & Davidson, 2019).

3.3.2 Interviews

The interview guides (see Appendix A and B) were structured thematically to keep a common thread throughout the interviews. Moreover, each interview used a variant of the same interview guide, with some minor changes to accommodate the specific company being interviewed.

The semi-structured approach gave the authors the liberty to ask the interviewees to develop or clarify on certain topics as the interview went along. This approach allowed for a deeper understanding of certain topics that the authors lacked knowledge of prior and helped to give

clear cut answers to complex issues. By conducting semi-structured interviews it will encourage the interviewee to respond in their own words and add valuable information without feeling too constrained or beholden to a rigid set of orders (Bryman & Bell, 2017). Therefore, efforts were made to formulate the questions in such a way that the possibility of simple yes or no answers was eliminated to the extent possible. In preparation for each interview, the authors were made aware of letting the interviewee finish speaking and never interrupting them so as not to disturb their train of thought. McGrath (2018) attaches great importance to respecting silent moments in order for the interviewee to gather his or her thoughts through an ongoing reflection. Moreover, the attentiveness by which the authors conducted themselves allowed for a greater opportunity to ask relevant follow up questions as they appeared.

The authors began each interview by introducing themselves and briefly explaining the purpose of the study and why their company was selected for the interview process. Both interviewees were asked questions on how they believed that their companies could have economic effects at an international, national and local level, how they measured the effects of their work on sustainable responsibility and regarding their companies' involvement with public actors. These questions were strategically added in the interview guides (see Appendix A and B) to better connect the answers to the triple bottom line and public-private partnership theory, which the research is partly grounded upon.

The interviews were audio recorded throughout the whole session with the consent of the interviewees for the purpose of transcribing the interviews to text correctly. Upon the completion of each transcription¹¹, the interviewees received a copy to confirm its validity. All three authors were present and active participants in each interview because of the advantages of dividing responsibilities (Bryman & Bell, 2017).

3.3.2.1 Limitations of interviews

The author's ambition was to arrange a physical meeting with each interviewee and to get the opportunity to visit the facility of each company. The authors believed that in-person interviews could have provided valuable information about the companies because of the

¹¹ The raw empirical data can be provided to the reader at the request of one of the authors

personal nature of seeing their work in conjunction with a tour of their facilities. Unfortunately, because of scheduling difficulties and corporate policy regarding visits in connection with the covid-19 pandemic, the interviews were conducted digitally in the form of video conferencing through the application Microsoft Teams. However, on the one hand, according to Bryman and Bell (2017), interviews conducted digitally or by phone have their advantages. Conducting interviews through video conferencing did allow the authors to be more time-efficient in the approach to gathering the empirical data, forgoing the necessity of travel. On the other hand, since certain issues did not get much space during the interviews, and the recordings of each interview contained inaudible portions, the interviewees responded with feedback through email to provide clarity and further detail.

3.4 Data analysis

For the analysis of the data, the interviews were linked to the theoretical framework. Through this approach, inferences were drawn based on the existing literature with the empirical data to support the arguments of the research findings (Morse, 2006).

3.5 Validity and reliability

The purpose of conducting a study with high reliability is to write with credibility. However, when writing a qualitative study, reliability is not described since it is so intertwined with validity. Every qualitative study differs from another and for various researchers it then becomes difficult to compare and secure the validity. The reason is that in a qualitative study there are no concrete procedures where it would have been possible to secure a studies validity (Patel & Davidson, 2019).

Patel and Davidson (2019) describe that when collecting data, it is very critical for researchers to successfully select information about the research area in a credible way. This applies through all parts of the research process. One way to minimize the problem of validity is to use several types of information sources. The concept of *triangulation* stands for precisely this, that a researcher collects data from several different types of sources such as interviews, literature and observations for example. The result can lead to the researcher receiving a number of different outcomes from a diverse set of sources. In a qualitative study, this is considered to enrich the research base (Patel & Davidson, 2019). To ensure the validity

of the study, the authors can not opt out of material that goes against their expected results. The authors must have a good reason to exclude data that may be valuable in the study (Committee on the Conduct of Science, 1989).

3.6 Ethical considerations

The study has been carried out in accordance with the ethical guidelines from the Swedish Research Council provided in their report *God forskningssed* (Vetenskapsrådet, 2017). The council describes four concepts that an ethical researcher must be aware of: *Secrecy*¹², *Professional secrecy*¹³, *Anonymity*¹⁴ and *Confidentiality*¹⁵.

Prior to each interview, the individual subjects of the study were informed about the intended purpose of the research and asked specific questions related to confidentiality (see Appendix A and B). This study has been conducted with the conscious effort in mind to fully honor their stated wishes when agreeing to be participating as research subjects.

¹² The principle of public access, i.e public documents must be publicly accessible (Vetenskapsrådet, 2017)

¹³ If information is classified, the duty of confidentiality also applies to this information. This may be broken when a researcher, in connection with the work on a research project, becomes aware of something that must be reported to the law enforcement (Vetenskapsrådet, 2017)

¹⁴ Anonymization of information is in some cases a prerequisite for ethics review boards to approve a study (Vetenskapsrådet, 2017)

¹⁵ The researcher must take measures to protect individual subjects personal integrity (Vetenskapsrådet, 2017)

4. Results

This chapter will present the empirical findings gathered from the interviews conducted with Svensk Plaståtervinning and Trioworld. The chapter has been divided into two parts, focusing on the findings from each company separately. Finally, a brief summary of the findings will be presented.

4.1 Svensk Plaståtervinning

Svensk Plaståtervinning is a non-profit company and when asked about this the respondent expressed that “It is about satisfying this function [recycling] and not necessarily that it should generate profit for the owners” (interview, April 12 2022).

In Svensk Plaståtervinning's own words, they are circular. When asked to clarify, the respondent stated that “In our world, circularity is about trying to return a packaging material that has ceased to serve a purpose to being able to once again fulfill a good purpose in a new life cycle” (interview, April 12 2022). In a circular economy, material recycling may not be the primary goal, there is much to value higher. For example, by avoiding the use of certain materials or by creating alternatives that do not need to be recycled in order to be reused, you avoid the tedious energy-consuming process of recycling, “We enter a later stage when the other alternatives are exhausted and it is time to recycle materials instead” (interview, April 12 2022). When it becomes difficult to maintain the quality of the material through the recycling process, secondary recycling, or something called downgrading¹⁶, becomes an option. In this case the plastic can be melted down and turned into something simple like a paving stone. However, it is then no longer accurate to speak of circular recycling because the linear life cycle of the material has simply been extended.

4.1.1 Collecting, sorting and recycling

Plastic recycling begins with households recycling their plastic packaging waste at one of the designated recycling sites located in the vicinity of all households in Sweden. These sites could be located either within the property in a garbage room or in a collection station

¹⁶ *Downgrading* refers to the process of using recovered plastic in a untypical application when recycling is not an option; such as in 'plastic lumber' (Hopewell et al., 2009)

outside, but adjacent to the property. Förpacknings- och tidningsinsamlingen¹⁷ (FTI) delivers the collected packaging waste to Svensk Plaståtervinning's facility in Motala, Sweden. When the collected packaging waste has been sorted, it is washed, heated and melted to make granules and then melted again to make new plastic products. The heating process involves the risk of damaging the plastic and to consume some of the stabilizers that are added to the plastic to prevent this process from occurring. Since only 10% of all plastic is recycled after a life cycle in Sweden, recycled plastic must be diluted with 90% virgin plastic when it enters a new life cycle and this negates the damage caused by the heating process to ensure that the plastic is of sufficient quality. However, it was expressed that as more plastic packaging is recycled in the future, less virgin plastic will be added to recycled plastic and this may highlight some of the quality issues that come with recycled plastic.

There is nothing to prevent consumers from recycling packaging waste incorrectly, which in turn means that all packaging waste recycled in the plastic recycling container will be collected by FTI and shipped to Svensk Plaståtervinning's facility. In terms of the composition of the collected packaging waste that is delivered to Svensk Plaståtervinning, a significant amount, approximately 30%, is non-plastic packaging waste, while the remaining 70% is plastic packaging. The plastic packaging is then sorted to separate and to exclude packaging material that is not suitable for recycling, this process leaves only 50% of the plastic packaging as suitable for recycling. As a last resort, plastic packaging that is not suitable for recycling is instead incinerated for energy recovery. Moreover, Svensk Plaståtervinning works closely with the packaging industry to inform them of how they can develop packaging design that is more suitable for recycling, to in turn decrease the need for incineration as a last resort.

The efficiency of sorting plastic packaging for recycling proved to be strongly dependent on current technical limitations. For example, sensors cannot identify plastic packaging that has been painted black, which is why black plastic packaging has historically not been recycled. Furthermore, labels on packaging makes it particularly difficult for the sensors to identify

¹⁷ FTI is a Swedish non-profit company responsible for the collection and recycling of packaging and newspapers. As a result of producer responsibility, FTI is financed by producers who are obliged to run a collection system to recycle products they themselves have put on the market (FTI, n.d.)

plastic, especially if the label is of a different material than the rest of the packaging, which also prevents recycling. Beyond the technical limitations for sorting, there are other obstacles that impede the recycling process. Packaging where several different types of plastic material have been joined and glued together in different layers makes it impossible to recycle each individual layer separately, which is a prerequisite for the final recycled product to be of good quality. This type of packaging has in recent years been used more widely in the wrapping of fresh produce. Finally, another limitation mentioned in the interview was expressed to be hinged on market demand; even after the recycling process of plastic packaging, there still needs to be a functioning recycling market for the final packaging product to drive demand for recycling. PET packaging has a very dominant position in the recycling market, which makes the recycling process quite uncomplicated, but other types of plastic packaging such as PVC lack an established recycling market and consequently the demand for recycling is simply non-existent. Even at times when demand has been relatively higher, the volume in question has been so small that the focus has shifted to other, more profitable materials. However, the respondent was optimistic that with the construction of Site Zero completed, Svensk Plaståtervinning would expand their capacity to recycle even more plastic packaging that would previously have been destined for energy recovery.

4.1.2 Sales and applications

Svensk Plaståtervinning made it explicitly clear that the end destination of the sorted plastic packaging is of the utmost importance to them. To ensure that the sorted plastic is not sold to dubious actors, is traceable and that it does not leak into the environment where it does not belong, Svensk Plaståtervinning only supply credible and large actors in Europe who are certified by EuCertPlast, an organization who works to standardize the plastics recycling process. Furthermore, the company places great emphasis on encouraging producers of plastic packaging, and also on the consumers, to demand transparency and traceability with the origin of plastic products.

According to the respondent, obstacles to the use of recycled plastic vary across different applications. For example, the use of recycled plastic in, above all, food packaging and medicinal applications, where people can come into contact with the material, was expressed to be particularly difficult for reasons of concern for human health and well-being. Moreover,

there is always a risk that there are traces of contaminants, which further constitute an obstacle to the use of recycled plastic in the aforementioned applications. However an exception to this rule was highlighted in the interview. Today, the only recycled plastic to be used as food packaging are PET bottles. This is generally thanks to the Swedish pant system which provides a total oversight of what goes in and out of the system, which greatly reduces the risk of the plastic being contaminated. In most other applications, the use of recycled plastics versus virgin plastics was stated to be similar. With the exception of some visual defects, recycled plastics are fully capable of being a viable alternative to virgin plastics in the applications they are used for. The respondent expressed that it is also important to have a sense of balance between the costs and benefits of using recycled plastics in different applications. The more you clean plastic from hazardous substances, the more energy and chemical processes are necessary and that can have environmentally harmful effects in other ways, “It is always important to have a balance between recycling as efficiently as possible for applications that do not require too much clean material, while for food applications, perhaps more advanced processes can be used to recycle materials” (interview, April 12 2022).

4.1.3 Sustainability

Svensk Plaståtervinning has two ways of measuring their level of sustainability. Firstly, the material recycling rate is measured to gain a better understanding of how much plastic material is recycled based on what the producers place on the market. In 2020, the recycling rate for plastic materials placed on the market was only 15% and the collection rate, which is also part of their measurements, tells us that 50% of plastic waste is not recycled by households, “Quite inefficient, one might think, large losses on the road and then the biggest losses are already with the consumer and in households” (interview, April 12 2022). These two measurements are important indicators for measuring the effectiveness of material circularity. Secondly, Svensk Plaståtervinning also measures the climate impact that the processes give rise to. The company follows the Greenhouse Gas (GHG) protocol to map all climate-affecting activities in their value chain, from collection to the material recycled, and they report this in their sustainability report.

The energy recovery process, which admittedly has its own harmful climate impact, is something Svensk Plaståtervinning would prefer to avoid, but due to many of the aforementioned limitations, it is an unfortunate reality that they have to deal with. The respondent expressed that “if we can steer the plastic away from it being incinerated until the material is recycled, we can make very large savings on greenhouse gas emissions, or avoid a lot of climate emissions” (interview, April 12 2022).

When asked about the company's possible economic effects locally, the respondent was convinced that the completion of their project Site Zero would result in great employment opportunities for Motala as a region. Furthermore, on a national level, Svensk Plaståtervinning could contribute economically by increasing the efficiency of plastic recycling:

When we can steer away materials that have gone to waste incineration to instead go to material recycling, there will be positive effects on the economy because the material is worth more if it can be recycled than destined to incineration, which costs money because you pay waste tariffs that go to incineration. (interview, April 12 2022)

Moreover, it was expressed to also have considerable effects from a socio-economic perspective due to the EU's 'plastics own resources' initiative, “if we do not reach the national or international goals for plastic recycling, we simply have to pay a fee to the EU for that difference” (interview, April 12 2022). On an international basis, the effect will be that Svensk Plaståtervinning sets a new standard for how material recycling can look. By showing how it works, the financial risks that companies take for various investments will be reduced if Svensk Plaståtervinning can demonstrate that it is technically possible, “We hope that more will be willing to make that kind of investment in the long run, if we can show that it is actually possible” (interview, April 12 2022).

The respondent expressed that countries around the world are at different stages of development in terms of their sustainability work. The limiting factor for a functioning recycling system in e.g. Southeast Asia is the absence of a collection system and it reduces

their 'waste management' to disposing of a significant amount of waste in the local environment. Even in countries where there is a functioning collection system, many are still lagging behind in terms of separating different packaging waste, which is an important prerequisite for recycling, but the respondent expressed optimism about the prospect of these countries to catch up by seeing how recycling is done in Sweden, "They will of course reach the same level as we sooner or later, the more good examples you can show, the easier it will be for them to make a wise decision" (interview, April 12 2022).

4.1.4 Organizational structure

Today, the company reports to Naturvårdsverket¹⁸ on how well their recycling activities are going and from next year they must also apply for a permit to conduct this type of activity. Furthermore, the respondent stated that Svensk Plaståtervinning has a close collaboration with public actors but noted that they are not in any form under the control of public actors, even though they show great interest in their business; as an example, collaboration with the Swedish Environmental Research Institute¹⁹ (IVL) was mentioned during the interview.

4.2 Trioworld

In recent years, Trioworld changed its strategy to reduce emissions and contribute to a sustainable future by shifting focus on becoming a more circular company. The respondent from Trioworld stated that "What we figured out pretty quickly was that the two biggest factors are our raw material and our end of life, what happens to our products in the end" (interview, May 5 2022). Trioworld has achieved this by using more recycled plastic in the production of their products and by designing products that are more conducive to the recycling process to extend the life cycle of the plastic. This means that the design favors single materials over several joined materials, due to the difficulty of recycling multilayer materials. Furthermore, the respondent stated that Trioworld aims to sort and buy plastic waste that can be measured to achieve the quality they demand of the recycled plastic and collaborates with different organizations that work towards the same goal to promote the plastic life cycle.

¹⁸ Naturvårdsverket is a Swedish public agency that works with environmental issues (Naturvårdsverket, n.d.b)

¹⁹ Swedish Environmental Research Institute (IVL) is an institute jointly founded by the Swedish state and national business interests to conduct research in the field of environment and sustainability (Svenska Miljöinstitutet, 2021)

4.2.1 *Sorting, recycling and reusing*

In 2021, Trioworld expanded its operations and made several acquisitions for recycling companies to be able to buy plastic waste and recycle it themselves. Trioworld also recycles its own production waste, but they also buy waste, finished materials and granules from other companies in Europe. When asked if Trioworld wash and granulate the waste they buy themselves, the respondent expressed that “sometimes we buy it sorted and sometimes we buy it so that we sort it [...] Depending on the application it is to be used for, it needs to be more or less well sorted” (interview, May 5 2022). Further details were given that the type of products the company manufactures are sensitive to contaminants in the plastic, therefore Trioworld places great demands on the plastic that is used in their products. It was mentioned during the interview that the definition of what is *recycled* is much debated. However, Trioworld has chosen to focus on a plastic called post-consumer resin or PCR because it is easier to extend the life cycle of, as it has not been contaminated by other plastics. Furthermore, the respondent expressed that customers also have demands on Trioworld's products, which pressures them to tailor the plastic films for the needs of the customer. Moreover, Trioworld works in a proactive way and would like to offer products to customers even before they know they are in need of it, “We have tried to make products available with recycled material before there is even a customer need because we believe that more and more people will demand this in the future” (interview, May 5 2022).

Trioworld is actively working on increasing the proportion of recycled plastic in their products. The respondent described that 5 to 10 years ago it was impossible to use recycled plastic in stretch films, which resulted in the plastic breaking off due to impurities. While today you can mix a proportion of recycled plastic in the production of stretch films, which Trioworld considers to be a great success for the plastic life cycle. In 2025, Trioworld aims to create products from 30% recycled plastic and by 2030, the aim is to have products from 50% recycled plastic. The respondent was asked how these goals would be achieved and stated “knowledge is needed, product development is needed, process development is needed [...] One must understand that with recycled raw material, our process is affected in a completely different way than if we have virgin [material]” (interview, May 5 2022). Furthermore, it was also stated that consumers must accept and be accustomed to cosmetic changes, that with such a high content of recycled plastic in their products, the plastic will look different.

Moreover, the respondent expressed some of the difficulties in increasing the proportion of recycled plastic in newly manufactured products:

Every time you reuse a fiber, in other words a polymer, it gets a little worse [...] So when you get a lot of recycled plastic, you have to make sure that something new comes in [virgin material], otherwise the system eventually dies. (interview, May 5 2022)

In order to have a functioning circularity of plastic, it is necessary to dilute the recycled plastic with virgin plastic in order for the recycled plastic to achieve a certain quality. However, the respondent was confident that the possibilities for using more recycled plastic in the future are great, but sees difficulties in creating products with 100% recycled plastic in the future even if improvements are made.

4.2.2 Sales and applications

According to Milios et al. (2018), the cost of recycled plastic relative to that of virgin plastic is an important factor in its demand. The respondent (interview, May 5 2022) was asked how the company relates to the problem of price competition between virgin plastic and recycled and answered:

It is about what the customer prioritizes [...] It usually costs more with recycled plastic depending on which product range it is about, but if it is important for the customer then maybe they are willing to pay extra for it.

Recycled plastic is often more expensive because the internal process is more difficult to handle; more resources and time need to be spent on recycling plastic. In order for the recycled plastic to maintain good quality, Trioworld requires that its suppliers' plastics have a EuCertPlast certification that ensures the quality of the recycled plastic. According to the respondent, Trioworld has tried to establish a business relationship with Svensk Plaståtervinning. However, Svensk Plaståtervinning's sorted plastic material does not reach the quality standard that Trioworld requires in its production. It was explained that their customers would hardly appreciate knowing that the origin of the recycled plastic packaging

is from public waste. Today, recycled plastic packaging is restricted from use in most food packaging, but according to the respondent, innovations are likely to solve these problems in the future by challenging antiquated laws. Moreover, there is a cosmetic angle that needs to be taken into consideration. There are certain legal requirements for how recycled plastic should look and feel, but both the legal requirements and customers are important factors in determining the quality of the recycled plastic. For example, recycled plastic bags have a tendency to feel lumpy, despite this, the respondent believed that consumers have learned to accept the noticeably different feeling. Furthermore, the respondent expressed bewilderment over the taxation on the production of all plastic bags, including recycled bags, given that the possibility in Sweden to import virgin plastic bags from other countries still existed. A while ago, Trioworld had to shut down the production of recycled high-content plastic bags due to this problem.

4.2.3 Sustainability

Trioworld's ambition is to be a leader of sustainable work in the plastic industry, and through the innovations the company has made, such as the high content of recycled plastics in their products, Trioworld are convinced that it is evidence that they have succeeded. Furthermore, Trioworld has a follow-up system to measure their sustainability work. This follow-up system works in such a way that the company enters values which are then followed up at regular intervals to measure the development in the sustainability work. Trioworld often participates in surveys and reports made by Naturvårdsverket. The company also has someone who is active in several standardization associations as well as in the EU contributing as an expert in different types of contexts as well as being informed about trends. The respondent believed that because of these actions, Trioworld could have a lasting effect on a national and international level.

4.2.4 Organizational structure

The respondent expressed a positive attitude towards collaborating with others and stated that Trioworld has no restrictions on their collaborations when it comes to sustainability issues and views collaborations positively with other actors who work towards the same goal. However, there are limitations on their collaborations with suppliers as Trioworld cannot use all types of plastic in their products. For example, Trioworld can not use PET bottles in the

recycling process to manufacture plastic products. Therefore, this complicates collaborations with actors who can not provide material that is of interest to the company.

4.3 Summary of results

To summarize the findings, the majority of the plastic packaging waste is not sorted or recycled and half of the plastic packaging that makes it to the sorting facility is destined for energy recovery. Although technical limitations and market demand for recycled plastic are a contributing factor to the low recycling rate, it is clear that the biggest loss lies with households, even before it has a chance to be sorted and recycled. Both respondents expressed that a bigger emphasis on the producer side, with regards to the design of plastic packaging to make it more suitable for recycling, would be an important step towards increasing the rate of recycling. Concerns for the quality and functionality of recycled plastic is something that technical innovations are increasingly solving, but it is also up to the consumers to ultimately accept that recycled plastics will have some cosmetic defects. In the case of food packaging, the use of recycled plastic packaging is almost non-existent due to regulatory concerns for consumer safety and well-being. Finally, both respondents were of the same opinion that a circular plastics economy to them is about creating a new life cycle for plastic materials.

5. Discussion

In this chapter the empirical findings gathered from the qualitative study will be discussed and analyzed from a theoretical perspective to broaden the understanding of circular plastics recycling in Sweden.

5.1 Recycling

At the heart of recycling in Sweden lies producer responsibility. Svensk Plaståtervinning aims to satisfy the industry's demand for a company to provide the function of recycling. The company is animated by this goal, rather than that of a profit motive, which expresses itself in the fact that Svensk Plaståtervinning's business model is non-profit. Furthermore, there are no dividend requirements from the owners and the company is not driven by short-term profit interests to the detriment of fulfilling its function, this is in accordance with what Hörisch et al. (2014) means by the concept of sustainability management. Profit is instead reinvested into the business to primarily increase innovation, efficiency and operational capacity; an direct example of these efforts being Site Zero, which is currently under construction to become the world's largest recycling facility. Furthermore, the completion of Site Zero is expected to bring with it great economic benefits in the local region by increasing employment opportunities and generating wealth for the community, this harmonizes well with what Elkington (1998) wrote about the third P, Profit. Moreover, both interviewed companies are working closely with EuCertPlast certified companies and Svensk Plaståtervinning is even actively encouraging other actors in the recycling industry to be transparent and have traceability over the origin of the plastics. The push for industry transparency can be seen as a way to gain legitimacy. This aligns well with the findings of Donaldson and Preston (1995), that transparency builds legitimacy with a company's stakeholders.

5.2 Producer demand

An obstacle to recycling is the lack of producer demand for certain types of plastic materials. With the increase in operational capacity of Site Zero, Svensk Plaståtervinning will have the opportunity to recycle material that has previously been neglected, such as PVC, and because of this it can open the door for new markets regionally in Sweden to meet the demand of

recycled plastic materials, no matter how small of a demand for the type of plastic to justify the recycling process.

5.3 Stakeholders

Trioworld expressed that they are pressured to manufacture products that fulfill the individual demands of their customers. As Wicks et al. (1994) and Donaldson and Preston (1995) states, it is important to include opinions from a company's stakeholders, and in this case the customer is a primary stakeholder, therefore, relationship building can bring competitive advantages (Hillman & Keim, 2001). The importance of stakeholders can also be connected to the second dimension, the social aspect of sustainability (Goodland, 1995). However, because Trioworld has ambitions to increase the proportion of recycled plastic in the production of its products, it is not advantageous if the functionality of the products suffer by not maintaining the same performance as before. We believe that functionality will always be of higher priority to customers than their demand or desire for more sustainable products. Therefore, we stand with the criticism directed at the stakeholder theory, that not all opinions are of equal value to decision-making (Jensen & Sandström, 2011). Since Trioworld is in the business of making profit, the performance of their products are of the utmost importance to customer satisfaction and guides the company's priorities. Moreover, Goodland (1995) and Spangenberg (2005) explain that with an increase in economic capital, natural and social capital should not be affected. However, this is not a decisive factor in this dilemma, because value maximization is an imperative for the survival of a company, we believe that Trioworld is trying to balance their approach by both value maximizing and including stakeholders opinions, in line with enlightened value maximization (Jensen, 2002).

For Svensk Plaståtervinning the situation is different since they have no profit motive. Svensk Plaståtervinning highlights the importance of sustainability over profit as their guiding principle of operation and therefore they are acting in accordance with Goodland (1995) and Spangenberg (2005). Moreover, the third P describes that profit is not about how much a company earns for its shareholders, rather it is about the economical impact on the local community (Elkington, 1998). We believe that if corporations take social responsibility by focusing on aspects of sustainability, rather than on profit alone, this will eventually have a downstream effect and lead to a change in consumption patterns, since the available products

on the market will be more sustainable. This is also something that the findings from Trioworld indirectly confirms, that consumers have learned to accept the cosmetic change in plastic bags on the market over the years. There is a need for product design that is more suitable for recycling, such as single-layer packaging that does not contain layers of different types of plastics. Moreover, this issue is covered by the producer responsibility obligation, that the producer should design products that are easily recycled. Although in practice, it has proved to be a demonstrably difficult task to accomplish as the producer responsibility obligation has been in effect since the year 1994. Both companies still express that design is an area where improvements are still needed to facilitate the recycling of packaging. It is important to continue a dialogue between both sides of the product's life stages, so that the recycling industry can express where the difficulties in the plastics recycling process are manifest and where improvements need to be made by producers, something that Svensk Plaståtervinning is already actively working on. In addition, consumers need to be informed about the different types of packaging that are difficult to recycle, such as black plastic packaging, in order to be able to make informed sustainable decisions about their consumption of plastic products. We believe that if producers heed the call of the recycling industry to design packaging more suitable for recycling, which will increase the overall recycling rate, it will result in an outcome of an improved circular flow. In the same way, it is equally important for consumers to be informed of the importance of recycling plastic waste properly, as consumers contribute to the largest loss in terms of recycling rate. This is in line with Hörisch et al. (2014), that education can create stakeholder value.

There is nothing to prevent consumers from recycling their waste incorrectly since there are no regulatory oversights for this in Sweden. By increasing the recycling rate of plastic, producers can increase the content of recycled plastic in their production, as long as it does not impede on the product's functionality. This will also enable companies to push their boundaries in terms of innovation as they have more recycled materials to work with.

5.4 Technical obstacles

Both companies recognized similar technical obstacles to recycling. Trioworld mentioned that through innovation, something that was considered impossible 5-10 years ago, such as stretch films made from recycled plastic, has been made possible. The company is actively

working to push the boundaries of recycling by overcoming technical obstacles by pursuing innovation. The cost of not doing this could result in a loss of a competitive advantage, according to Barney (1991) and Bates and Flynn (1995). As innovation is a central driver in obtaining competitive advantages (Atkinson & Ezell, 2012) we can see that the company managed to find a solution to their issues with the product by working with the innovation of the manufacturing process. Moreover, for continued improvements in innovation; knowledge, product development and process development were emphasized as of the utmost importance.

As it stands today, 10% recycled plastic is diluted with 90% virgin plastic when a recycled product is manufactured because of the low rate of recycling. Furthermore, a long-term problem involves the heating process that is involved when recycling plastics. Due to the high amount of virgin plastic used in the production of recycled plastic today, many of the quality concerns of recycled plastics products are unseen. As the rate of plastic recycling increases, it is likely to reveal some of the problems that can occur when plastic products begin to have higher concentrations of recycled plastic.

5.5 Sustainability

It is clear from the empirical findings that both Trioworld and Svensk Plaståtervinning consider themselves circular and work actively to maintain the life of the plastic as far as possible. Both companies have a form of a collaboration with public actors. By a close collaboration with Naturvårdsverket and IVL, Svensk Plaståtervinning provides with and exchanges knowledge that benefits both sides, which is in accordance with the public-private partnership theory (Bovis, 2006), a way for the private sector to benefit the general public. Naturvårdsverket is one of the public authorities that Trioworld also works closely with, additionally they work with the EU as well. We believe that collaborations like these are crucial for the future development of circular plastics recycling in Sweden and for the rest of the European Union. With the obligation of producer responsibility in Sweden, this is a way for the private sector to discuss and highlight the obstacles that they believe are lowering the recycling rate. Therefore, the existing critique of the theory (Custos & Reitz, 2010) can not be applied in this case, since the Swedish regulatory framework is not violated by the theory.

The results gathered from Trioworld aligns with indicators used for monitoring sustainable performance (Goodland, 1995; Elkington, 1998; United Nations ESCAP, 2015), since they use a follow-up system where numbers are frequently reviewed. We believe that this is a strategic way to monitor performance and be able to draw conclusions about sustainability progress. However, if the criticism of such a tool is neglecting the area of the ecological systems (Milne & Gray, 2013), it is something that we believe is relevant as the TBL does not address that area. Nevertheless, TBL is still pursuing companies to monitor their impacts on many important dimensions of sustainability and therefore we do not concur with Milne and Gray (2013), that TBL is moving companies towards being unsustainable.

The findings of this study indicate that circularity is a process of becoming; something both companies strive towards through ever-increasing innovation and refinement of processes, rather than a state of being; something that the companies can transform themselves into at will. However, with time and through the support of initiatives by the authorities, the process can be encouraged and accelerated.

5.6 Regulations

The EU has presented initiatives for the member states transition to a circular economy, such as the Green Deal (Utrikesministeriet 2020), as well as policies on plastic regulations and fees (European Commission, 2018). Both companies have the ambition of working towards circular plastics recycling to the full extent. Site Zero will become the first climate-neutral plastics recycling facility, and Trioworld has the ambition to have products that contain 50% recycled plastic by the year 2030. These efforts can be linked to Elkington's (1998) second P, Planet and Goodland's (1995) description of environmental sustainability. Moreover, the producer responsibility obligation ensures that the responsibility for recycling is up to those who are responsible for placing the product on the market and it follows the principle that the *polluter pays*. We believe that this delegation works well in Sweden, as it incentivizes producers to design products that are better suited for recycling and more environmentally friendly. Since the EU fee of plastics own resources creates environmental costs for the member states that generate plastic waste that is not recycled (European Commission, 2018; European Commission, n.d.b), Sweden will benefit greatly from the incomparable recycling capabilities of Site Zero.

As discussed by Sen et al. (2021), governmental regulations are often a hindrance to circular economies and this was observed to be correct in relation to the full expression of circularity in applications where it is possible in practice to be circular. Difficulties in implementing circularity across plastic applications are most evident in food packaging due to government regulations on health and safety. Although these concerns were valid when the regulations first came into effect, Trioworld believes that technical innovations in the recycling processes have rendered current regulations antiquated. Svensk Plaståtervinning concurs that more advanced chemical treatments will make it possible to reduce the risk of contaminants that can be harmful to humans. However, while this may seem promising, it is important to be of the mindset that *less is more* by understanding that in the end, good-hearted efforts to be more sustainable should not inadvertently result in harm to the environment. As per Goodland (1995), pursuing sustainability is primarily about protecting human life. In this anthropocentric view, because humans depend on the proper function of ecological processes to sustain environmental life-support services, a balance needs to be struck between using harsh chemicals where necessary for the recycling process and refraining from harsh treatments in other applications where it is not necessarily needed; even accepting that some recycled packaging might contain traces of contaminants in applications where it will not be unsafe for consumption or have harmful effects on human health.

In summary, it seems that the work towards a more sustainable future needs to begin with an examination of ourselves. It is about having a change in mindset, of how we view and expect things to be like. People have become so accustomed to an unsustainable way of thinking that it permeates the very way we look at and interact with the world. It is about growing out of the idealized world and waking up to the real world where imperfections are normal and part of everyday life. The idealism of previous generations must be transformed into a pragmatism for future generations. The cosmetic issue of recycled plastic is a broader societal matter that has its roots in this highly idealized way of thinking. In practice, the habit of walking into a grocery store and looking for that visually perfect fruit is what prompts producers to select for fruits with no visual imperfections at the expense of perfectly edible fruit that is thrown away. This also primes consumers into the belief that perfection is the only valid outcome for achieving the good. Moreover, the proper way of conceiving of the world in a sustainable

way must be that as long as it is functional and does not cause harm, the visual appearance of a recycled plastic product should not be a factor in consumer decision-making or consumption preferences. This is supported by the CEAP (European Commission, 2020) to push for a more sustainable consumption pattern for plastics. The more this way of thinking prevails over the minds of consumers, the less demand there will be for virgin plastic products.

6. Conclusion

This chapter will describe the conclusions made in relation to the purpose and research question of the study, as well as recommendations for future research.

This case study of two Swedish plastic recycling companies has examined the obstacles to a circular plastics economy in Sweden. The purpose of this study was to gain a better understanding of the obstacles to circular plastic recycling and manufacturing of recycled plastic products for companies in the Swedish recycling industry. Based upon the findings, the authors have drawn the conclusion that obstacles are manifold, with the biggest challenge existing on the consumer side. Producer demand, technical, design and regulatory obstacles were also a factor, although improvements in these areas are being made and are likely to play a lesser role in the future. An increase in recycling rate is sooner to come from the overcoming of obstacles that exist on the industrial side; producer demand, technical, design and regulatory obstacles, rather than on the consumer side.

There is nothing to prevent consumers from recycling packaging incorrectly, it is difficult to affect consumer behavior, as there are no regulations or feasible ways to exert control over consumers recycling habits, hence, change in consumer behavior will have to be an ongoing process that bears its fruit over time. Regulations are discouraged as the authors believed it would be contrary to the very idea of producer responsibility to suddenly hold consumers responsible for what producers ultimately place on the market. The producer responsibility obligation encourages producers to design packaging that is easy to recycle, is resource efficient and less environmentally harmful. Through education and information campaigns about recycling and the harmful effects of plastic pollution, consumers could become more conscious of their consumption patterns and their own environmental impact on recycling to do what is right, rather than do what is convenient. Producers could also further contribute by designing plastic packaging that facilitates recycling for consumers. The problem of plastic pollution is impending and the solution finds itself in the integration of a circular plastics economy.

6.1 Recommendations for future research

This study can be further developed through a comparison with other member states of the European Union to see what measures are being taken and what obstacles exist to increase the recycling rate of plastics, since all the member states have to abide by the same directives and the plastics own resources fee applies universally within the EU. It would also be interesting to do a study of the whole supply chain for the circular plastics economy, as additional obstacles could be identified on this side of the chain. Also, since this study draws the conclusion that consumer behavior is difficult to control due to a lack of regulatory oversight, a study based on behavioral economics could contribute to a better understanding of how incentive structures, like the pant system in Sweden, could help to influence consumers recycling habits.

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Appendix

Appendix A: Interview guide for Svensk Plaståtervinning

Tack för att du ville ställa upp på en intervju. Vi är tre studenter från Handelshögskolan vid Göteborgs Universitet som just nu håller på att skriva vårt examensarbete inom Corporate sustainability. Vi har valt att skriva om cirkulär plaståtervinning, vilket är orsaken till att vi önskade denna intervju om Svensk Plaståtervinning. Innan vi börjar vill vi bara gå över några **sekretessfrågor**:

- Har vi ditt samtycke om att få använda ditt namn i studien eller vill du förbli anonym?
- I syfte att kunna transkribera intervjun behöver vi spela in den, har vi ditt godkännande för det?

Intervjufrågor

Allmänna

- Vilken roll har du i Svensk Plaståtervinning?
- Hur ser dina arbetsuppgifter ut?
- Vi har läst på er hemsida att Svensk Plaståtervinning är ett icke-vinstdrivande företag, varför är det så?
- På vilket sätt är ni cirkulära och vad menar ni exakt med cirkulärt?
- Varför tror Sverige är så ledande inom miljöarbete? Tror du det är politiska beslut, socialt eller på samhällsnivå som förklaringen ligger?

Sortering- och återvinningsprocess

- Vart får ni in plasten som ni sorterar? Vad är dess ursprung?
- Gör ni någon skillnad på plastens kvalitet som ni köper in/samlar in?
 - Avstår ni från att köpa in/samla in plast som är av sämre kvalitet eller som inte uppfyller era krav?
- Ni skriver på er hemsida att ni har en automatiserad teknik med precision som sorterar av högsta kvalitet, vi har läst att ni bränner upp plast som inte uppfyller kvalitén för sortering/återvinning.
 - Vilka krav ställer ni på plasten som inte sorteras/återvinns?
 - Vad är det som hindrar er från att sortera/återvinna all plast?
 - Är det kunden som har kvalitetskrav?
 - Är det att plastens livslängd nått sitt slut?
- Kan man säga att det är teknologiska förutsättningar som sätter hinder för att återanvända plastförpackningar som är lämpade till livsmedel utan att vi exponeras för dem kemikalier som kan vara skadliga för oss?

- Förbränning av plast, är det något ni helst undviker och använder som medel när plasten inte når kvalitetskraven?

Försäljning

- Vem säljer ni den sorterade plasten till?
- Kan vilket företag som helst köpa plast från er?
- Vi har läst att företag hellre vill köpa eller tillverka ny plast på grund av att de anser att kvalitén är bättre på jungfrulig plast. Hur förhåller ni er till detta?
- Varför tror ni att företag kommer vara villiga att köpa plast från er och inte jungfrulig plast?
- Tror ni att ni kommer kunna uppfylla kvalitén på plasten så att den är jämförbar med jungfrulig plast?

Hållbarhet

- Mäter ni effekterna av ert arbete gällande hållbart ansvar? Gör ni detta och isåfall hur?
- Tror du att Svensk Plaståtervinning kan ha ekonomiska effekter på internationell, nationell eller lokal nivå?
- Det som intresserade oss att intervjua Svensk Plaståtervinning är er ambition att bygga världens största anläggning för plaståtervinning, Site Zero. Tror du att Site Zero kan komma att påverka hur plaståtervinning sker i andra länder?

Organisationsstruktur

- Är Svensk Plaståtervinning helt privat eller samarbetar ni med publika aktörer också?
 - Kan det bli att ni startar ett projekt med dem [publika aktörer]?
- Ni har ett rikstäckande system för insamling och återvinning av plastförpackningar i Sverige för verksamheter med producentansvar. Kan du förklara själva processen av insamlandet.
- Finns det politiska hinder som stoppar publika aktörer från att göra det jobbet Svensk Plaståtervinning gör?
 - Kan det hända att vi går mot en framtid där publika aktörer tar mer ansvar?

Stort tack för ditt deltagande, vi känner oss nöjda med intervjun. Är det något du har funderingar över?

Appendix B: Interview guide for Trioworld

Tack för att du ville ställa upp på en intervju. Vi är tre studenter från Handelshögskolan vid Göteborgs Universitet som just nu håller på att skriva vårt examensarbete inom Corporate Sustainability. Vi har valt att skriva om cirkulär plaståtervinning, vilket är orsaken till att vi önskade denna intervju om Trioworld. Vårt syfte med vårt examensarbete är att undersöka *Plastic pollution and circular economy in Sweden*, om hur en cirkulär ekonomi kan hjälpa att

minska på plastföreningar. Vi vill börja med att informera dig om att deltagandet i denna intervju är helt frivilligt och du har rätt att avbryta när du vill. Du har också rätt att avstå från att svara på frågor. Innan vi börjar vill vi bara gå över några **sekretessfrågor**:

- Har vi ditt samtycke om att få använda ditt namn i studien eller vill du förbli anonym?
- I syfte att kunna transkribera intervjun behöver vi spela in den, har vi ditt godkännande för det?

Intervjufrågor

Allmänna

- Berätta lite kort om Trioworld och din arbetsroll. Hur ser dina arbetsuppgifter ut?
- På vilket sätt är Trioworld cirkulära och vad menar ni exakt med cirkularitet? Hur går den processen till?
- Vart får ni in den återvunna plasten som ni använder? Vad är dess ursprung?
- Plastförpackningar som ni köper in, sorterat ni, tvättar och granulerar den själva?
- Vi hade tidigare en intervju med Svensk Plaståtervinning, har ni ett samarbete med dem?
- Gör ni någon skillnad på plastens kvalitet som ni köper in?
 - Avstår ni från att köpa in plast som är av sämre kvalitet eller som inte uppfyller era krav?

Återanvändningsprocess

- Vilka krav ställer ni på plasten som ska återanvändas?
 - Är det kunden som har kvalitetskrav?
 - Är det att plastens livslängd nått sitt slut?
- Vi har läst att ni har tagit er an en djärv plan för att öka innovationstakten med fokus på cirkularitet inom plast. Vilka innovation kommer leda till denna förändring?
- År 2030 har ni som mål att använda 50% återvunnen plast, vad måste ske för att detta ska kunna bli möjligt för er verksamhet?
- Vad är det som hindrar er från att ha ännu högre andel av återvunnen plast i era produktion?
- Är det möjligt att ha 100% återanvänd plast i er produktion i framtiden?

Försäljning

- Vi har läst att många företag hellre vill köpa jungfrulig plast på grund av att de anser att kvalitén är bättre. Hur förhåller ni er till detta?
 - Varför tror ni att företag är villiga att köpa plast från er och inte jungfrulig plast?
 - Med tanke på att ni har ambitioner att öka andelen återvunnen plast i er produktion av plastprodukter. Tror ni att ni kommer kunna uppfylla kvalitén på plasten så att den är i jämförelse med den jungfruliga plast?

- Är det vissa applikationer av plast, vi tänker på när det kommer till livsmedelsvaror till exempel, är det då viktigare att det är säkrare och mindre kemikalier för hälsan? Påverkar det er?
- Är det kemikalier då som hindrar?
- Du gick in lite tidigare på hur det ser ut kosmetiskt, är det också ett hinder?
- Men det finns inga lagkrav på just det området när det kommer till det kosmetiska utseendet och lukt eller finns det? Är det kunden som sätter det?
- Återvunnen plast anses oftast vara dyrare än jungfrulig plast, är detta något som påverkar er möjlighet att vara konkurrenskraftiga?

Hållbarhet

- Förklara hur ni arbetar med hållbarhet? Vad är det som utmärker ert hållbarhetsarbete?
- Hur mäter ni effekterna av ert arbete gällande hållbart ansvar?
- Tror du att Trioworld kan ha hållbara effekter på internationell, nationell eller lokal nivå?
- Tror du att Trioworld kan ha ekonomiska effekter på internationell, nationell eller lokal nivå?

Organisationsstruktur

- Är Trioworld helt privat eller samarbetar ni med publika aktörer också?

Stort tack för ditt deltagande, vi känner oss nöjda med intervjun. Är det något du har funderingar över?

Appendix C: Interview information

Respondent 1 - Date: 12-04-22 Time: 46 min

Respondent 2 - Date: 05-05-22 Time: 35 min