

Opportunities and challenges of plastic recycling

Attitudes and ideas of younger generation consumers

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Muovin kierrätyksen mahdollisuudet ja haasteet - Asenteita ja ajatuksia nuoremmalta kuluttajasukupolvelta

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Tiivistelmä

Muovien tuodessa paljon hyvää ja tarpeellista yhteiskunnalle, niiden varjopuolena on muovijätteen aiheuttamat haitat, kuten vuosittain kasvavat jätemäärät luonnossa ja merissä. Luontoon päätyvä muovijäte olisi yhteiskunnalle taloudellisesti kannattavaa hyödyntää, sillä muovia kierrättämällä edesauttaisimme kiertotaloutta. Näin voitaisiin suojella hupenevia luonnonvaroja, sekä vähentää muovijätteen aiheuttamia ympäristöhaittoja.

Työn tavoitteena oli tutustua nuoremmalla kuluttajasukupolven ajatuksiin ja asenteisiin muovin kierrätyksestä, joista mahdollisuuksien mukaan voisi syntyä kehitysideoita jätehuollosta vastaaville sidosryhmille. Tutkimus toteutettiin hyödyntämällä kartoittavaa tutkimusmenetelmää, mikä sopi tavoitteiden kvalitatiiviseen luonteeseen. Tutkimusta varten tehtiin kysely, jonka tarkoituksena oli vastata tutkimuksen tavoitteisiin keräämällä vastauksia nuoremmalta kuluttajasukupolvelta. Kaiken kaikkiaan kyselyyn vastasi 73 henkilöä, joista suurin osa oli Suomesta kotoisin.

Tulokset osoittavat, että vaikka nuoremmalla sukupolven kuluttajat ovat suurelta osin aktiivisia muovin kierrättäjiä, paranneltavaa edelleen riittäisi. Muovin kierrätysaktiivisuuteen vaikuttaa kierrätysprosessin yksinkertaisuus, sekä ihmisten motivaatio kierrättää. Edistääkseen muovin kierrätysprosesseja, täytyy niiden olla mahdollisimman yksinkertaisia. Koska yksinkertainen kierrätysprosessi auttaa kasvattamaan kierrätysmääriä, tulisi jätehuollosta vastaavien sidosryhmien huomioida tämä yhä paremmin toiminnassaan.

Kiertotaloudella tarkoitetaan tuotteiden, materiaalien, sekä luonnonvarojen säilyttämistä ja huoltamista yhteiskunnassa niin pitkään kuin mahdollista. Tämä vaatii työtä kaikilta osapuolilta yhteiskunnassa. Tutkimuksen tuloksia hyödyntämällä voitaisiin edesauttaa muovin kierrätysprosesseja, samalla edesauttaen kiertotaloutta.

Avainsanat (asiasanat)

Kierrätys, muovin kierrätys, kuluttajien asenteet, yksinkertaisuus, kiertotalous

Muut tiedot (salassa pidettävät liitteet)

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Abstract

While plastics provide a lot of benefits to society, the downside of this is the impact that plastic waste creates on the environment. Plastic waste that ends up in the environment would be a valuable resource for society because by recycling plastics, we would be promoting a circular economy and by this conserving natural resources and energy that would be needed to produce virgin plastics. This would also reduce the impact plastic waste has on the environment.

The goal of the study was to look into the minds of younger consumers, specifically their thoughts and attitudes towards recycling plastics, which could help provide waste management value chain with ideas on how to improve recycling practices and outcomes. This research was conducted by using an exploratory research method which suited the objectives qualitative nature. For this, a survey was created and sent out to younger consumers in order to meet the objectives. All in all, the survey was answered by 73 respondents, mostly from Finland.

The results indicate that generally, younger consumers do not find recycling plastics too difficult to do, but things could be further improved so that recycling rates would increase. Simplicity and motivation play key parts in the whole recycling process. To improve plastic recycling practices and outcomes, recycling plastics should be as simple as possible for everyone and with stakeholders within waste management value chain focusing on this, recycling rates would ultimately increase.

Furthermore, a circular economy is about conserving products, materials, and natural resources for as long as possible. For this, all individuals within society must work together in order to reduce the problems that come from plastic waste. With the results from the study could stakeholders within waste management value chain develop and improve plastic recycling practices and outcomes and hence, help promote circularity.

Keywords/tags (subjects)

Recycling, plastic recycling, consumer attitudes, simplicity, circular economy

Miscellaneous (Confidential information)

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1 Introduction

1.1 Background

Plastics are a huge part of the world we live in today and as well in the future. Plastics have changed the way people work, study, play, and generally, how we live our day to day lives. Most groceries people buy are packed in plastic and most grocery stores have plastic bags for sale so that people can put their groceries in them to carry home. The equipment we use to work, and study are at least in some extent made of plastic, for example, for work or studying, these days can mostly be done with computers or laptops which are built from various different parts, including plastic. Plastic as a material is very light, it can take a hit due to being durable, and also, plastic is very multifunctional when it comes to what people can do with it (Brems, Bayens, & Dewil 2012, 669). This is why it has become one of the most used materials there is and ultimately something today's people could not live without.

While plastics have opened the world to new possibilities, it has also come with a price. Due to increased use of plastics, huge amounts of waste is ultimately generated. For this, not only the environment is at risk, but so is the public health of people (Shin, Um, Kim, Cho & Jeon 2020, 1). Today, most plastic waste ends up incinerated or landfilled which both are bad for the environment. Not to mention all the plastic waste that ends up in the oceans and other parts of nature which happens illegally due to circumstances of different countries. It is estimated that if this does not stop, by the year 2050, there will be around 12 billion tons of plastic waste in nature. To tackle the threat that plastic causes to the environment, many countries are developing systems so that plastic waste can be used as a resource, which ultimately saves limited raw materials.

1.2 Motivation

The reason for making thesis research for this topic is mainly because of the authors own interest towards it and the authors overall concern of the impact that plastic waste has on the environment. Also, because plastics are being used more and more, causing major environmental issues due to waste, looking into the methods of how

plastic waste is managed, specifically in Europe and the recycling habits of a younger generation of consumers is what interests the author, therefore the author began conducting this research.

1.3 Research objectives & questions

Recycling plastics, while important as it is towards the environment, not all people feel obliged to do so. Looking into the minds of younger generation consumers could in fact help with improving plastic recycling practices and outcomes. Therefore, the research objectives for this study are as follows:

- To give an overview of plastic recycling and the impact plastics have on the environment
- To look into the thoughts of younger generation consumers regarding plastic recycling
- To provide waste management value chain the ideas from younger consumers towards improving plastic recycling practices and outcomes

To reach these objectives, the following research questions were defined:

- RQ1: What is the current situation of plastics and plastic recycling, specifically in Europe?
- RQ2: What are the motivations, attitudes, and pragmatic ideas of a younger generation towards plastic recycling?
- RQ3: What should happen within waste management value chain to improve plastic recycling practices and outcomes?

1.4 Structure

Looking at the structure of this paper, it begins with the introductory chapter where the background is meant to give insights of how plastics have become a part of our daily lives and of the outcome of plastic waste. This section in a sense sets the tone to the rest of the paper. Moving on in this chapter, the authors motivations towards the topic are discussed and following this come the research objectives and questions. The second chapter consists of the literature review. It includes relevant secondary literature of plastic recycling, plastics effect on the environment, the

management, production, and demand of plastics in Europe, circularity, recycling attitudes, and finally a summary of the knowledge base which sums up the literature review. After gaining the needed information and knowledge of the topic in the literature review, the next chapter describes the methodology and the reasons of picked choices. Furthermore, data collection and analysis processes are discussed in this chapter. The following chapter is where the survey result analysis is provided. And finally, conclusions are drawn, and the research questions answered. Lastly, the assessment of the research process and results, limitations, and the author's suggestions for further research are discussed.

2 Literature review

This chapter presents literature that is needed to gain a comprehensive understanding of why plastic recycling is important, plastic waste and its impact on the environment, a circular economy, and factors that affect recycling attitudes. The literature is meant to provide the necessary background knowledge of the topic so that the following research and its meaning can be better understood. The information in this chapter is taken from previous literature provided from different sources such as academic research, books, and articles.

2.1 Plastics effect on the environment

While the literature on plastics generally highlight several advancements to society, such as societal benefits and advances in technological and medical fields (Thompson, Moore, Saal, & Swan 2009, p. 1), they also cause major environmental issues. Disposal of plastic wastes into landfills and even nature have created problems for wildlife, such as animals ingesting plastics from the ocean that is the result from improper plastic waste management. Andrady (2011, p. 1596) noted that plastics were found in the ocean the first time back in 1970. For over 50 years, plastics have been causing problems for the environment, especially the oceans, and for all animals in their natural habitats. Most of the plastics that end up into the oceans are plastics intended for packaging which do not have that long of a lifetime all to begin with. Also, small fragments of plastics called microplastics can be found in oceans around the world, being ingested by various marine species. These microplastics are derived from larger plastic debris and are of the size of 5 mm or smaller.

Drzyzga and Prieto (2019, p. 1) addressed that plastic waste leaks into the environment in large amounts which not only causes environmental damage, but economic damage as well. 5-13 million tonnes of plastic ends up in the environment every year. This is why recycling plastics should be a priority to people because it reduces plastics ending in landfills which ultimately minimizes plastic waste leaking into the environment. The usage of plastics isn't sustainable all to begin with. Plastics need oil as a feedstock and as previous research has established, from the world's oil

production, 4% goes to the production of plastics while another similar amount is used as energy (Thompson et al. 2009, p. 1.). Also, the fact that packaging is the largest part of plastic production, and they have the shortest life due to being discarded after use is also unsustainable. This is why plastic recycling is important.

2.2 Plastic waste management generally

According to Ncube (2021, 5), there are three different ways plastics are managed after being used. The three ways are disposing, recycling, and incinerating. In 2015, around 6300 million tonnes of plastic waste had been generated. From this only 9% was recycled, 12% incinerated, and 79% ended up in landfills and nature. From these three ways of disposing plastic waste, the only way for eliminating the waste completely was by incineration. The following figure shows data that has been gathered from 1950 to 2015.

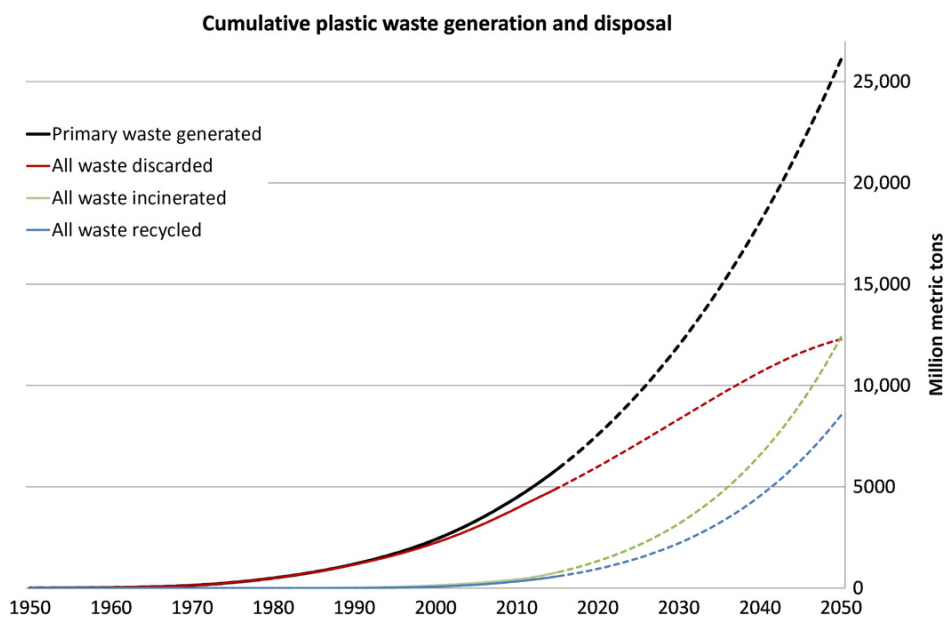


Figure 1. Plastic waste generation and disposal (adapted from Ncube et al. 2021)

As the above figure displays, the generation of plastic waste has been estimated to rise drastically. The solid lines display data that has been already gathered and the dashed lines show an estimate of generated and disposed plastic waste all the way to 2050. This estimate clearly displays how the already bad environmental situation

plastic waste has created will rise to even higher alarming levels. This is why all stakeholders of plastics within waste management value chain should think of better ways of producing and disposing of plastics so that plastic pollution can be stopped. The stakeholders and waste management value chain will be discussed later on.

Plastics and recycling methods

Brems et al. (2012, 670) discuss that plastics can be burned in appropriate waste incinerators with heat and power generation because plastics are hydrocarbons. Plastics can also replace fossil fuels in production processes by serving as a secondary fuel. Both of these thermal applications lead to the destruction of the plastics completely, which requires advanced pollution control measures. As mentioned, burning plastics replace fossil fuels. For this, burning plastics is not efficient when it comes to waste management, since proper waste management should reduce greenhouse gas emissions.

According to Brems et al. (2012), there are two groups that plastics can be divided into: thermoplastic and thermosetting plastics. Thermoplastics can be remoulded by heating while thermosetting plastics cannot. Out of the whole plastic consumption, thermoplastics take about 80%, which is good for giving the end product a chance to be reused after recycling it. Typical thermoplastics are used in plastics such as packaging and textiles. Thermosetting plastics are for applications that are more demanding, such as for plastics that are used in high temperatures.

Brems et al. (2012) also discuss the two alternative and most known methods for recycling plastics which are secondary recycling/advanced mechanical recycling, and tertiary/feedstock recycling. In mechanical recycling, plastic waste is reprocessed into new plastic products that aren't as high quality that they were before. In feedstock recycling the plastics are broken to their constituent monomers. Drzyzga et al. (2019) also note that the most common method for recycling plastic waste is mechanical recycling, where this method covers the collection, sorting, washing, and grinding of the waste. In Europe, mechanical recycling is for the moment almost the only form of recycling plastics which is over 99% of everything recycled (PlasticsEurope, 2021). Recycling plastics mechanically is processing waste into secondary

raw material without changing the structure of the material that significantly and basically all thermosetting plastics can be mechanically recycled so that the end quality has only little to improve if even that.

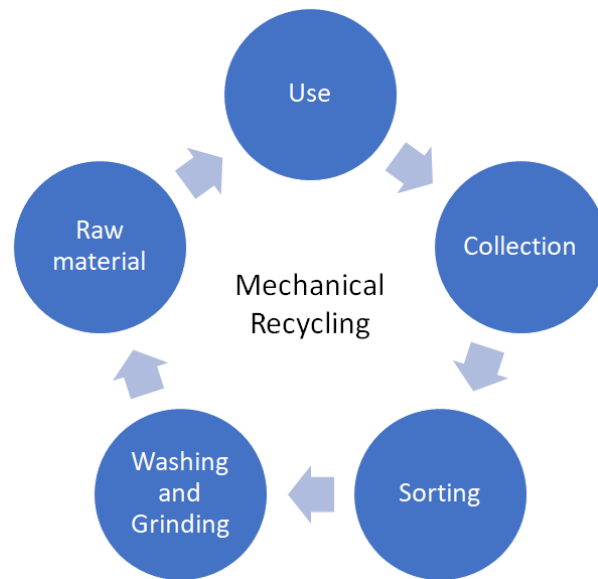


Figure 2. Mechanical recycling process

The challenges of plastic recycling

Recycling plastics of course has its benefits, but it can be challenging, nonetheless. The most notable benefit for recycling plastics are of course all the environmental benefits. Recycling plastics leads to conserving natural resources and energy that would be needed for producing virgin plastic (QuiddityAsia, 2020). Also, the more plastics are recycled, the less is discarded into landfills.

Plastic recycling, specifically mechanical recycling has its challenges. Recent literature on the topic has noted different challenges that recycling plastics have. QuiddityAsia (2020) has pointed out some of the things that challenge the recycling process of plastics. For example, one challenge for mechanically recycling plastics is that the collected plastics are contaminated which leads to downcycling into lower value products. La Mantia (2004) notes that recycled materials are commonly seen as lower-class materials compared to virgin materials, hence recycling=downcycling. Moving on to other challenges QuiddityAsia (2020) has pointed out, “only a fraction of

‘recyclable’ used plastic is recycled into the products for which they were originally produced”. These challenges arise because when plastics are produced, they withgo through colorants, additives, and fillers. Furthermore, plastics contaminated by consumers and also yield losses during the recycling process are also reasons that challenge plastic recycling.

In addition to that has been discussed above in this chapter, even though recycling helps with the problems that plastic creates, it is not the end solution. Each time plastics are recycled; it leads to the plastics losing their quality over and over again. Ultimately, it leads to the need to dispose of the material eventually (QuiddityAsia, 2020).

2.3 Plastics in Europe; Management, production, and demand

According to PlasticsEurope (2020, 30), in 2018, the total amount of post-consumer plastic waste collected for further treatment was 29,1 million tonnes. From this, 42,6% went to energy recovery, 32,5% to recycling, and the rest 24,9% went to landfills. As mentioned earlier, according to Shin et al. (2020, 1), most plastic waste ends up incinerated and landfilled globally. For this, we can say that at least Europe is in the right direction, with plastic waste ending into landfills had the smallest percentage in 2018 according to PlasticsEurope (2020, p. 30). In fact, the amount of recycled plastic waste has doubled from 2006 to 2018 in Europe (p. 31).

29 M T COLLECTED PLASTICS FOR TREATMENT

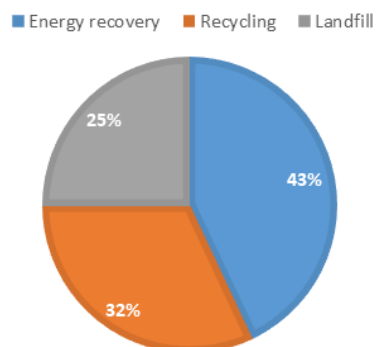


Figure 3. Treatment of collected plastic waste in 2018. (adapted from PlasticsEurope 2020)

Previous research has established that the production of plastics has been rising steadily through the past years. According to PlasticsEurope (2020), looking at the production of plastics from 2018-2019 in the entire world, the production rose from 359 million tonnes to 368 million tonnes. Then again Europe's production of plastics declined from 61,8 million tonnes (2018) to 57,9 million tonnes (2019) (p. 16).

The total amount of demanded plastics converters in Europe (2019) was 50,7 million tonnes. Divided into segments, packaging is clearly the biggest market where plastics are needed with 39,6% of the total demand. The second largest segment is Building and construction with 20,4%. Third is the automotive segment with 9,6%. The rest goes to electrics (6,2%), household, leisure & sports (4,1%), agriculture (3,4%), and finally all the others which include appliances, mechanical engineering, furniture, medical, etc. (16,7%) (p. 24).

2.4 The Circular Economy of Plastics

As mentioned earlier, from the total amount of post-consumer plastics collected in 2018, approximately a third was recycled. Also mentioned earlier, plastic packaging has the biggest cut in the market, which also means packaging creates most waste. For these reasons, The European Commission is working on tracing plastic waste. The following is from the Commissions Strategy for Plastics in a Circular Economy (Foschi & Bonoli 2019, 2), with goals for sustainable plastic packaging. The Circular Economy has a plan for plastics with a set of targets that must be reached by the year 2030:

1. All plastics in the European market must be reusable, or recyclable cost-effectively
2. Over 50% of plastic waste must be recycled in Europe
3. Due to an increase in sorting and recycling, new jobs are ultimately created all over Europe
4. The secondary plastic market will quadruple in size

Maximizing that the value of products, materials, and resources are maintained in the economy for as long as possible, and minimizing waste is what becoming a Circular Economy is all about (Europa.eu, Closing the loop - An EU action plan for the Circular Economy, 2015). This is the European Union's contribution to create an

economy that is as sustainable as possible, low carbon, but still remains a competitive economy.

Ncube (2021) emphasizes that to deal with waste effectively, we have to forget the old model that was “make, use, and dispose” and move towards a more sustainable “make, use, reuse, and recycle” model. Recycling is what ultimately creates a circular loop for once the product has met its end after being used, it can be returned to the factory as a raw material, hence conserving resources. The following figure illustrates a circular economy for plastics.

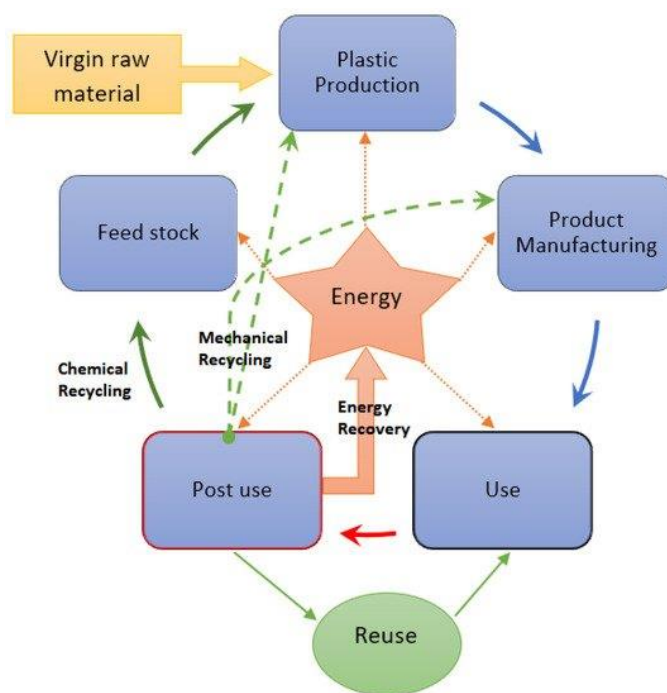


Figure 4. Plastics circular economy (adapted from Ncube 2021)

For the circular economy to function properly, every section within society must do their part. This includes basically everyone from consumers, people working in waste management, manufacturers, and the government. That were just mentioned are all stakeholders of plastics within waste management value chain. With stakeholders within waste management value chain, the author means the overseers of waste, such as the government and manufacturers of plastics, and not the individual consumers, although the word stakeholders means all people within the value chain. In

the figure below, Ncube (2021) displays all the stakeholders within society who by doing their part can truly make a difference and curb plastic pollution.

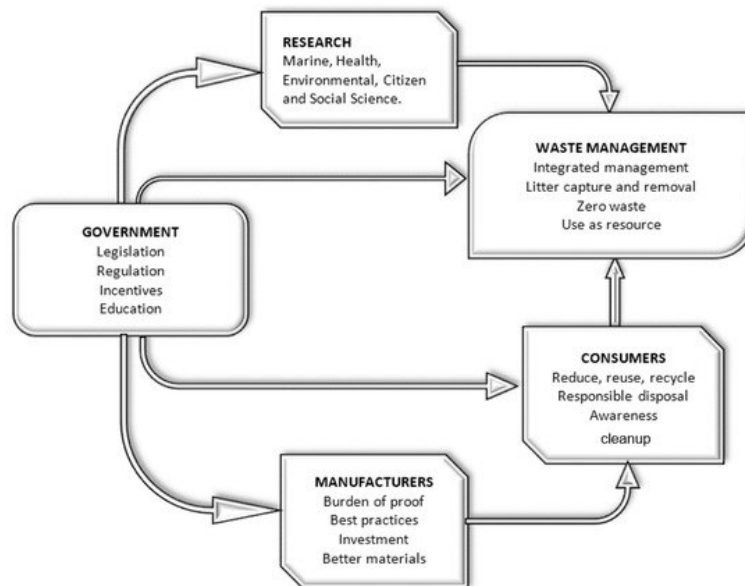


Figure 5. Cooperation between all sectors to curb plastic pollution (adapted from Ncube 2021)

As seen in the figure above, the government keeps an eye on all the other sectors as an overseer. The government's responsibilities include monitoring and gathering data on how plastics are produced, used, and disposed of. After collecting enough information, the government can introduce policies and systems to tackle the problems that are caused by waste and ultimately begin waste reduction which is what is meant with becoming a circular economy. Developing these waste reduction systems is of paramount importance for the future of our planet. If the current ways of managing plastics do not change to the better, 12 billion tonnes of plastic waste will end up into the environment by the year 2050. So, for this not to happen, governments must act and regulate, businesses should innovate, scientists must do research, and consumers and individuals should do their part and reduce, reuse, and recycle their plastics. Only by pulling the same rope can society reach a circular economy of plastics where managing waste has become so effective that it has curbed plastic pollution.

2.5 Opportunities and outcomes of a Circular Economy

For the Circular Economy to function properly, the European Commission is working on amending Europe's waste legislation, which includes all waste and not only plastic waste. This means that the Commission is looking into ways to improve waste management, increase recycling rates, and limit landfilling (Deselnicu, Militaru, Deselnicu, Zainescu & Albu, 2018). The Commission has proposed to ban landfilling of not only recyclable plastics, but also glass, metals, paper, cardboard, leather, and biodegradable waste by the year 2025. This improvement of saving resources has noticeable business potential. Efficiently using the resources previously landfilled has the potential of saving 630€ billion every year for the European industry. Approximately 600 million tonnes of overall waste materials that could be recycled or reused is currently lost. On average, only 40% of household waste in Europe is recycled. With these numbers in mind, the European Commission has set targets that are to be reached by the year 2030:

1. Recycling 65% of municipal waste
2. Recycling 75% of packaging waste
3. Specific materials for different packaging materials
4. Reduction of landfills by 10%

These waste proposals have positive outcomes that benefit the economy, citizens, and of course, the environment (Deselnicu et al, 2018). The proposals give Europe access to affordable and high-quality raw materials, which makes the economy more competitive. Ultimately, by becoming a more sustainable economy, new jobs can be created. Potentially, 170000 jobs can be created by the year 2030 in Europe. Also, once properly executed, finer eco-design's, preventing waste, and reusing waste could bring up to 600€ billion in net savings or 8% of their annual turnover for businesses in the EU. And finally, the proposals have a positive environmental impact from reducing landfills and by recycling materials. Both reduce greenhouse gas emissions and with reducing landfills and recycling waste, less waste will leak into the environment to cause even more problems. Recycling is a precondition for a circular

economy to function. Here waste is seen as a valuable resource and once recycled, it can be returned again and again back to the economy. This minimises the effect waste has on the environment and lowers the cost of production. One form of waste to mention is of course plastic waste. To increase plastic recycling rates, of course efficient sorting of the waste is essential, but also a smart design of the plastic could help increase recycling rates.

2.6 Factors behind recycling attitudes

Jhangiani and Tarry (2014, 168) note that the term 'attitude' refers to relatively enduring evaluations of something, where the something is referred to as the attitude object. The attitude object can be anything, such as a person, a social group, or a product.

Every individual has their own attitude towards things in life. Attitudes are evaluations of the attitude object that involve feelings such as liking, disliking, hating, and loving. Jhangiani and Tarry (2014) mention that research has found that attitudes can be inherited at least to some extent by genetic transmission from parents. They also note that attitudes can also be learned either directly or indirectly by experiences with the attitude objects.

Jhangiani and Tarry (2014) also define an environmentalists' assumable attitude towards recycling below. Peoples' attitudes are formed from cognitive, affective, and behavioural components:

- Affect: The environmentalist is happy to recycle
- Behaviour: The environmentalist recycles regularly
- Cognition: The environmentalist believes that recycling is the right thing to do

Some people recycle and some don't. As Johansson (2016, 407) mentions, it is very difficult to say why someone recycles while another does not, although there are different factors that can affect recycling behaviour. The factors are dependent on external and internal conditions. For example, if you see a rubbish bin designed as a basketball hoop, some people might find this a fun idea and be more eager to hit the

target with their rubbish. Here we can say that the basketball hoop is the external factor and the increased willingness to hit the target is the internal incentive.

If a task is easy to do and you are motivated to do it as well, the task will most likely be done without a doubt. Then again, if the task is somewhat hard to do and you aren't that motivated to do the task anyways, the task will most likely not be finished (407). The same goes with recycling. If recycling would be made simple for everyone and if everyone would be motivated to do it, the amount of recycling not only plastics but all waste would rise exponentially. The following figure shows Johansson's model which is meant to explain recycling behaviour.

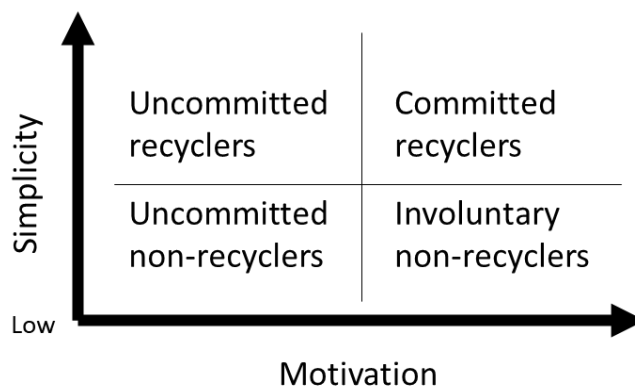


Figure 6. Recycling behaviour model (adapted from Johansson 2016, 409)

As seen in the model, there are four different types of characters with their own recycling behaviours. It is quite clear that the committed recyclers are the ones who recycle the most out of the other three groups of characters. They have high motivation towards recycling, and they find recycling to be a simple enough task to do so. Opposite to the committed recyclers are logically the Uncommitted non-recyclers. This group tends to have no intention to recycle for they do not find the task simple and lack motivation to do so. The remaining two groups, the involuntary non-recyclers and uncommitted recyclers are a bit different from the previous groups. The involuntary non-recyclers are people who understand the importance of recycling but do not recycle regardless of it being important. This can be due to not being physically able to perform the task (recycling) as they would like to or that there aren't sufficient recycling facilities nearby or they haven't got appropriate instructions to

help perform the task. Finally, the uncommitted recyclers are people who recycle without it being a big deal. Recycling might have become so easy for them, so that it has become a part of their day to day lives. It has become even habitual for some so that they don't have to even give an extra thought to perform the task (410).

So, as the recycling behaviour model (Figure 1) illustrates, both simplicity and motivation are what the whole recycling process is dependent of. With high motivation and high simplicity, the recycling rates go up and vice versa. Although, the model also shows us that simplicity is more important than motivation when it comes to recycling. If something that is considered as a complex task but then one day it has been made simple to do, this can lead to changing your old ways. Even though simplicity is more important regarding recycling, motivation shouldn't be left out of the picture. After all, if a person is dedicated to find a recycling facility when there isn't one near them, this means he/she has the motivation to recycle even though the simplicity of the whole process is low.

The following *"how behaviour can be affected"* is adapted from Jhangiani and Tarry (2014, 173): *Imagine your friend trying to decide whether to recycle a plastic bottle. We know that your friend has a positive attitude towards recycling and that your friend wants to recycle the bottle. We also know that recycling the bottle takes some work. Throwing the bottle away would of course be an easier choice. Then again if your friend sees the importance of recycling the bottle, close people of your friend are also keen on recycling, and if there's a recycling facility close by, your friend will most likely develop a strong intention to perform the behaviour, in this case recycle the plastic bottle.*

The above paragraph simply concludes this chapter. Although, it defines a person with a positive attitude towards recycling. For a task such as recycling plastics, simplicity and motivation are of paramount importance. Simplicity on the other hand can increase recycling rates for the majority of people if recycling has been made easy for them as Figure 6 depicts.

2.7 Summary of the knowledge base

Summing up the key concepts and findings in the previous sections covering key literature on the issue area, this thesis stands on the following findings of the prior-art research:

- In today's world, plastics are needed every day. Plastics have had a huge impact for not only people, but also the environment. The advancements that plastics have created to society and the growing demand of plastics have left their mark on the planet. With growth in demand and production of plastics, it is of utmost importance to also grow the recycling rates of plastics.
- While the recycling process of plastics has developed and improved throughout the years, still, there is room for improvement. Moving towards circularity requires work from not only stakeholders in waste management but also responsibility from every individual consumer. With the targets set by the European Commission to reach a circular economy and implementing the "make, use, reuse, and recycle" model, the positive outcomes can be seen not only on the environment but also the economy and citizens.
- The attitudes and practices towards recycling are affected by the context issues such as perceived simplicity towards recycling, age, cultural background of the individuals, habits, close people, and so on. Simplicity and motivation affect recycling behaviour, which then again affect the current recycling practices. With change in simplicity and motivation to better positive outcomes, the future recycling practices can have better outcomes as well.

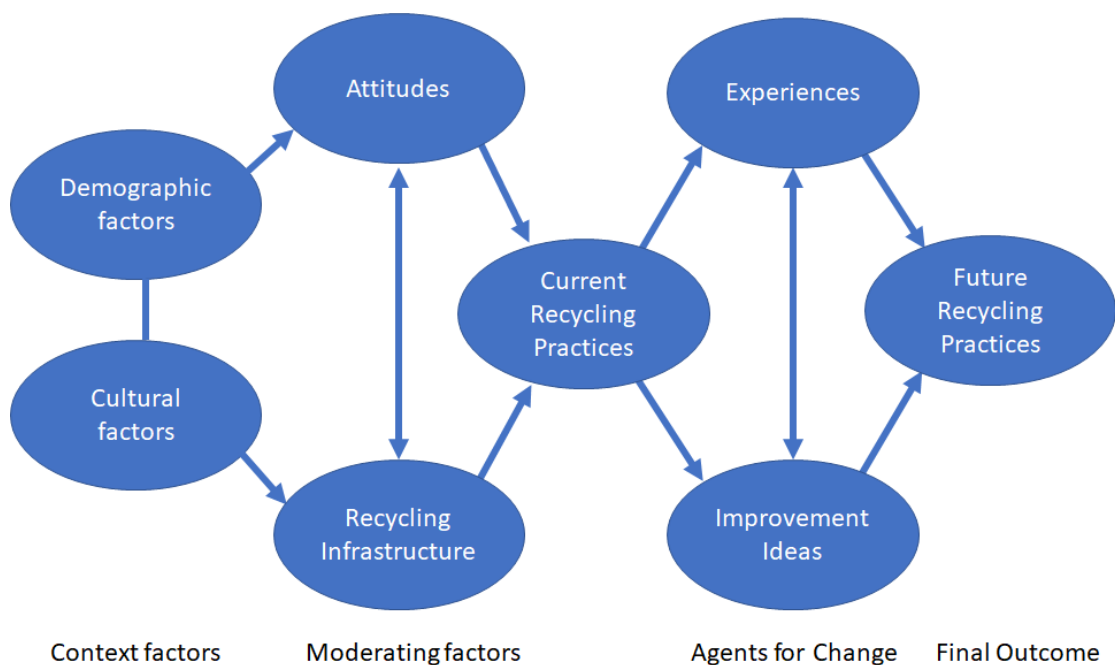


Figure 7. Towards future recycling practices

People are becoming more and more environmentally conscious, especially the younger generation consumers. The younger generations are today's and the future's plastic users and recyclers, hence studying these groups and aiming at the improvements proposed by them should be noted.

3 Methodology and implementation

Saunders, Lewis, and Thornhill (2009) mention that the terms ‘research methods’ and ‘research methodology’ are often used interchangeably and that the word ‘methodology’ is just a more verbose word than the word ‘methods’ is. They also note, “The term methods refer to techniques and procedures used to obtain and analyse data. In contrast, the term methodology refers to the theory of how research should be undertaken” (3).

In this chapter the research design, the purpose, data collection strategy, and data analysis methods are discussed.

3.1 Research design

With the framework (Figure 8) created by Saunders, Lewis, and Thornhill (2009), the author was able to define the research methodology. It was very useful for helping create the research design.

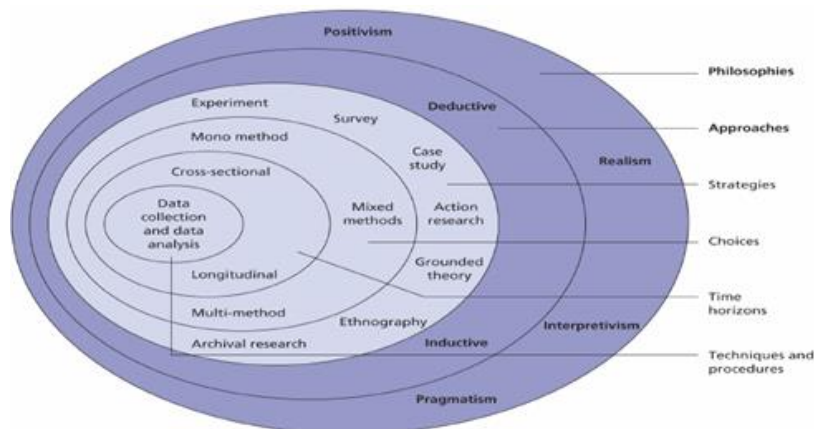


Figure 8. The research ‘onion’ (adapted from Saunders, Lewis, and Thornhill 2009)

This study has an inductive approach. This is for all the secondary data that the author has collected beforehand. According to Saunders, Lewis, Thornhill (2009, 61) an inductive approach for defining a research question requires prior knowledge of the

subject. With an inductive research approach, data would be collected and after this, a theory can be conducted with analyzed data (124).

The strategy that the author chose was survey. Walle (2015, 50) describes a survey as a research method where people are asked for the same information to understand their thoughts regarding the subject in hand. The survey for this research was conducted with questions intended to meet the research objectives.

Saunders et al (2009) establish the different types of questionnaires in the following figure.

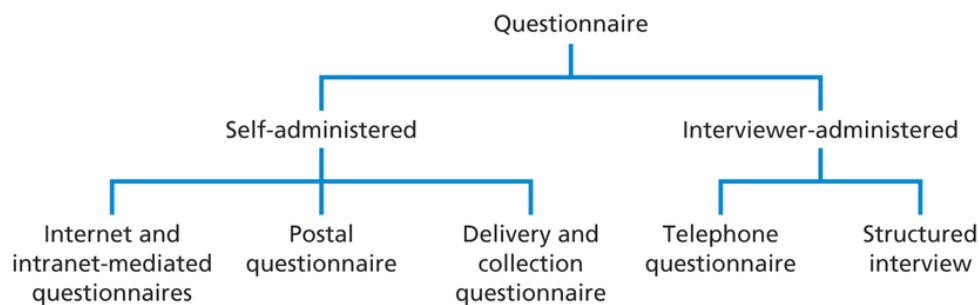


Figure 9. Types of questionnaires (adapted from Saunders, Lewis, and Thornhill 2009)

As seen in the above figure, there are many types of questionnaires. For this research, the author designed the questionnaire as self-administered, and internet and intranet-mediated. These types of questionnaires can be easily completed by respondents with a virtual platform without assistance (362-363). The platform used for this research was Google Docs and the intended time for gathering a sufficient number of responses was roughly 1 month.

The aim of this study was to look into plastic recycling generally in Europe, to discover the attitudes and ideas of a younger generation of consumers towards plastic recycling, and to find out what more should stakeholders within waste management value chain do to improve plastic recycling practices and outcomes. The research purpose for this thesis was chosen to be exploratory due to the research questions and objectives qualitative nature. Saunders et al. (2009, 139) describe an exploratory

study as a way to find out what is happening, to find new insights, to ask questions, and to assess phenomena in a new light. This type of study is very useful for clarifying the authors understanding of a problem. In this thesis, the research objectives and questions involved looking into the motivations and attitudes of people and so, the exploratory study was chosen.

The time horizon in this thesis was cross-sectional because the target was to investigate the phenomenon in such a way, that it could provide insights on the situation at the present time. This study used the survey strategy, and a cross-sectional study often employs this type of study (155).

The data that was used for this research was both primary and secondary. The secondary data helped evaluate the current and most relevant literature to help understand the topic. Then again, the primary data was meant to create a framework of the thoughts of younger generation consumers towards plastic recycling that stakeholders within waste management value chain could implement for better practices and outcomes.

3.2 Sample

The sample represents a younger generation of consumers and their thoughts of plastic recycling. A sample like this can include people from many different backgrounds, such as students, people who are working, different nationalities, and in this case, people who recycle plastics and who do not recycle plastics. For this study, the sample was collected by 'snowballing'. Saunders et al (2009, 240) note that once making initial contact, in this case by forwarding the survey to the first group of people, the new contacts can reach out to new contacts and so on, hence, the snowball keeps on growing the further it goes.

3.3 Questionnaire building

The three types of data variable that can be collected with a questionnaire as Dillman (2007) distinguishes are opinion, behaviour, and attribute (Saunders et al., 2009). Opinion variables demonstrate the feelings of the respondents towards the

questions and or what they think is true or not. When recording the respondents' behaviour, you are in fact recording what they are doing. Behavioural variables are of data of what the respondents have done in the past, are doing now, or are going to do in the future. Attribute variables then again are of peoples' characteristics. These characteristics can be for example, the respondents' age, sex, educational background, and so on. This variable is a useful way to look into the background of the respondents and how it can affect their behaviour and opinions.

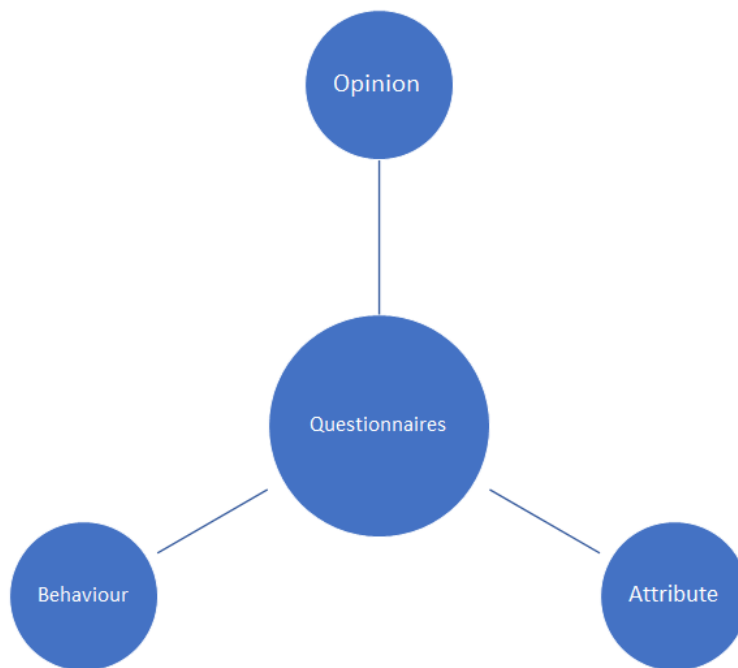


Figure 10. Data collected with questionnaires (modified from Dillman 2007)

In this research, all three variables were used to collect data. An example of an opinion variable question is "Do you think recycling should be taught in schools?". This question got the respondents feelings towards the question. An example of a behaviour variable question is "What do you recycle generally?". This question was intended to inspect the respondents current recycling behaviour. An example of an attribute variable question is "Age?". The attribute variable questions opened up the respondent demographics. It was necessary to ask these demographic attribute variable questions to ensure the respondents represent the sample (3.2) that was discussed earlier.

Building a questionnaire requires understandable language, hence the questions in this survey were written as simple as possible so that people from different backgrounds could answer the questions without problems. As already briefly mentioned, the survey was created with Google Docs which provided a simple platform for the respondents to answer the questions. The platform then again automatically created charts from the respondents' answers so that the author could implement them in this thesis.

3.4 Data collection

As already mentioned, both primary data and secondary data were included in this study. Saunders et al. (2009, 256) describe secondary data as data that has already been collected for some other purpose and primary data is new data that is collected for a certain purpose. The secondary data for this study was intended for the reader to see the impact plastics have on the world and the current situation of how plastics are recycled generally and in Europe so that they could better understand the purpose of this study. Also, as this thesis was to study the attitudes of a younger generation towards recycling plastics, the word 'attitudes' was looked into, as well as how motivation and simplicity to perform a task can affect an individual's attitude and behaviour. The primary data is the new data that was surged from the survey results.

Before finalizing and sending out a survey, Saunders et al. (2009, 394) recommend pilot testing. Pilot testing will make sure the questions within the survey are understandable and can be answered without outside help so that the data can ultimately be collected. To ensure the survey for this study was understandable, the pilot testing technique was used. The survey was sent out to 3 people before distributing it to larger groups of people. The feedback from the pilot testing was positive. It appeared that the respondents could answer the questions without problems understanding the questions, and they were simple and easy enough to follow along. Furthermore, the time to complete the survey took around 5 minutes and this was then mentioned in the message that was sent out to larger groups of people.

The survey was intended to reach the sample (3.2) and to get responses from a younger generation of people with different backgrounds and views. The survey was

sent through mainly by the author's own contacts on WhatsApp. The author found this to be the most effective way to reach out to large groups of people, such as groups of students, people in the working life, and even both. The survey was sent with a short message that informed the respondents about the required time to finish the survey and that it would help if they could forward (snowball) the survey onward to their own contacts. The final number of responses that the survey received was 73.

3.5 Data analysis

In this research the data was analysed from the charts created by Google Docs. The platform provided the results in Microsoft Excel which allowed the author to look into each response more in depth whether it was necessary.

Most of the data did not need that much in depth analysing since the charts provided by the platform displayed the necessary information from the questions. Some questions then again required a deeper look, such as the ones regarding recycling efforts. Excel was a helpful tool for these questions to look into the average responses and the averages of male and female respondents.

One notable question was "When you were growing up, did your parents/guardians recycle generally?". The number of positive answers were approximately the same as the number of positive answers regarding the respondents recycling efforts.

Whether these people were exactly the same, cannot be stated via this analysis. It would need additional analysis and perhaps a larger sample that would support the relationship of background and ones' current attitudes and habits. Also, background should not be seen as a determining factor, new generations can learn from the mistakes of the previous ones, at least in theory.

3.6 Research ethics and results verification

As Saunders et al. (2009, 183-184) mention, in research, "ethics are of the appropriateness of your behaviour in relation to the rights of the ones who become the subject of your work, or are affected by it". They also point out, "research ethics relates

to questions about how we formulate and clarify our research topic, design our research and gain access, collect data, process and store our data, analyse data and write up our research findings in a moral and responsible way.”.

Many ethical issues may arise during research. These concern things such as privacy of participants, the participants right to withdraw from the process, consent and deception of participants, keeping the data confidential and maintain anonymity of participants. In regards of this research, the mentioned issues were considered.

As for the survey for this research, Google Docs provided a platform for the respondents so that they could answer the questions anonymously. The questions did not require any personal nor sensitive information that could jeopardise the respondents' anonymity or privacy. Pilot testing was also used for this research as mentioned earlier (3.4) which had three respondents answer the survey before sending it out officially. Since the results of pilot testing was positive, the author could send out the survey to larger groups with hopes it would “snowball” (3.2) its way to many respondents. Participation of course was voluntary, and the respondents were informed that to fill in the survey would not take much of their time.

The way the questions were formed was as neutral as possible, meaning that the questions were not biased in any way by the author. It was important that the respondents could answer the questions so that the way the questions were formed could not imply the way they should be answered. Also, to reduce the respondents possibilities to feel bad about some of the demographical questions, for example, “Gender?” the respondents had a chance to respond “Other” and “Don't want to specify”. Also asking the age of the respondents was considered, so the choices to answer were in age groups rather than the exact ages of the respondents.

As this research was not only of primary data that surged from the survey, but it was also about secondary literature. The literature review in this paper was critically reviewed and valid sources were used for it. All other authors were appropriately and rightfully mentioned in-text and the sources are listed in the references in a way that they can be retrieved with the provided details. This way avoids the risks of plagiarism.

4 Results

This chapter displays the results from the survey with discussion on each questions outcome. The results have been divided into different subchapter sections to be easier to follow along.

4.1 Respondent demographics

The first question was to find out the gender of the respondents. As the below figure shows, 61,6% (45 respondents) were male and 38,4% (28 respondents) were female.

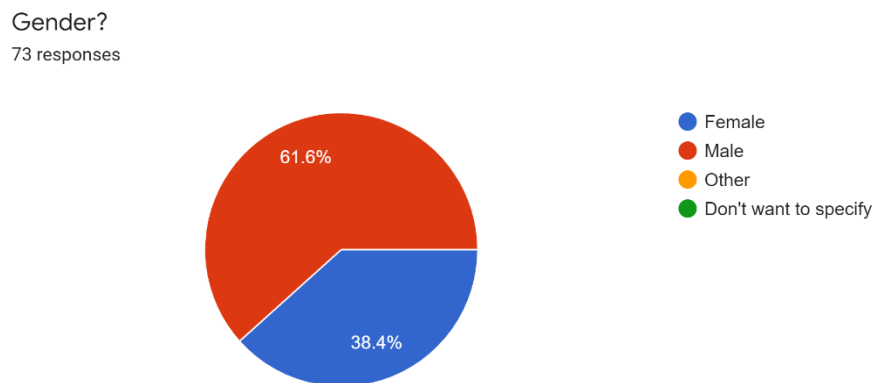


Figure 11. Gender of respondents

In this survey, the targeted age group was people aged 19 to 30. The reason for this is that this study was meant to look into the younger generation's views of recycling plastics. The age was then divided into 4 groups so that it can be more easily analysed. Most of the respondents were 22-24 years old (45,2%). The second largest age group was 19-21 years old (26%) and close to this the third group was 25-27 years old (23,3%). The rest were 28-30 years old (5,5%).

Age?

73 responses

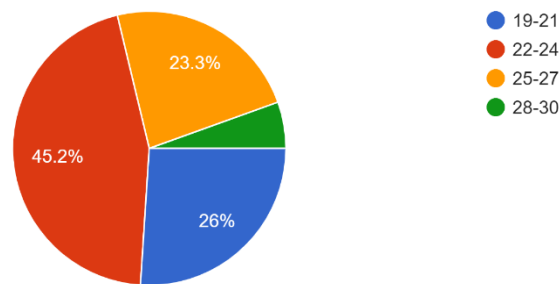


Figure 12. Age groups of the respondents

When it comes to nationality, the author knew beforehand that most respondents will most likely be coming from Finland. For this, the nationality of respondents was asked as seen in the figure below. Out of all the respondents (73), only 3 people were not from Finland. Also, current location of residence was asked, and 72 people of the respondents currently live in Finland while 1 person chose 'Other European'.

Nationality?

73 responses

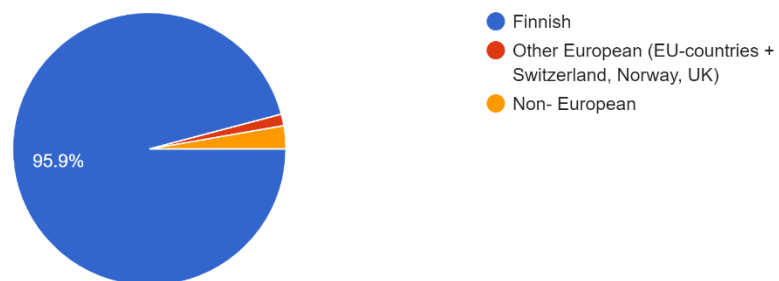


Figure 13. Nationality of respondents

Moving on, the fifth question was to see whether the respondents were students or working or even both. The majority were students (45,2%) and next were people both studying and working at the same time (35,6%). The rest of the respondents were people in the working life (19,2%).

Are you currently?

73 responses

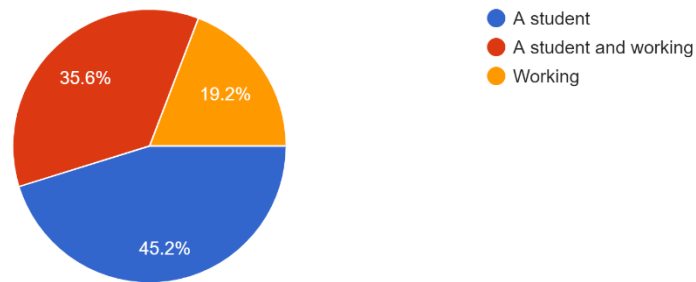


Figure 14. Studying and/or working

4.2 Recycling efforts

The questions in this section were meant to discover the respondents' recycling efforts and what they recycle generally. Each figure below establishes the percentages from the answers.

The first question in this section was meant to discover the respondents' efforts to recycle generally, comparing their selves with their own idea of the average consumer, logically from 1 to 5 where 1 is low and 5 is high. The pie chart was automatically created with Google Docs, which also allowed the author to create a Microsoft Excel spreadsheet. With Excel the author was able to calculate the average of all the respondents' answers and the average of male and female respondents as well.

How would you describe your own recycling efforts compared to your idea of an average consumer's recycling habits? (from 1 low to 5 high)

73 responses

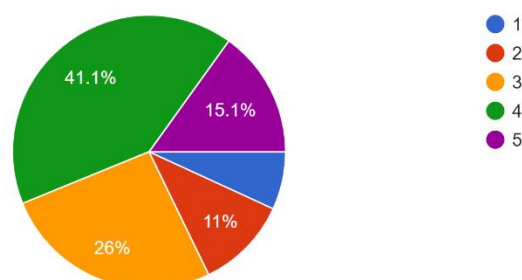


Figure 15. Recycling efforts question 1

Table 1. Percentages and averages

1	2	3	4	5	Average	Male average	Female average
6.8%	11%	26%	41.1%	15.1%	3.47	3.22	3.86

As the above figure and table depict, most of the respondents viewed their own efforts to recycle to be higher than their idea of an average consumer. An average consumer can be anyone of any age from any background, hence the question was asked as seen in Figure 15. The responses indicate that at least a younger generation of consumers see themselves to have more effort when it comes to recycling. In the table above, the average of the responses can be seen and also the average of male and female respondents separately. Female respondents with the rate of 3.86 implies that females tend to recycle more than male respondents with the rate of 3.22.

The following question was somewhat similar to the previous question. The purpose of the question was to discover the respondents' efforts to recycle compared to their peers within their age group, again from 1 low to 5 high.

How would you describe your own recycling efforts compared to most of your peers (friends and colleagues, etc.) of your age group? (from 1 low to 5 high)

73 responses

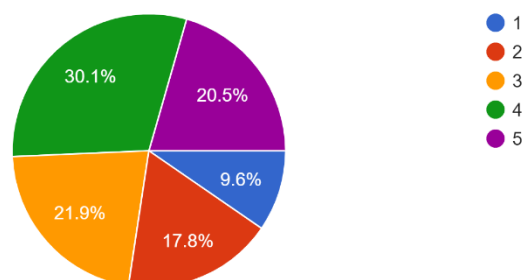


Figure 16. Recycling efforts question 2

Table 2. Percentages and averages

1	2	3	4	5	Average	Male average	Female average
9.6%	17.8%	21.9%	30.1%	20.5%	3.34	3.22	3.54

As the figure and table above display, over 50% of the respondents view their selves to have more effort when it comes to recycling compared to their peers. The average rate was 3.34 which is just above average. Just as in the previous question, the female average rate was higher than the males; female average was 3.54 and male average was 3.22.

The next question was meant for looking into what each respondent recycles generally. The question had multiple choices for the respondents to choose from. Also, there was a choice 'other, what? (respond below)', for if there was something else the respondents recycled that was not on the choices above.

What do you recycle generally? (choose 1 or more)

73 responses

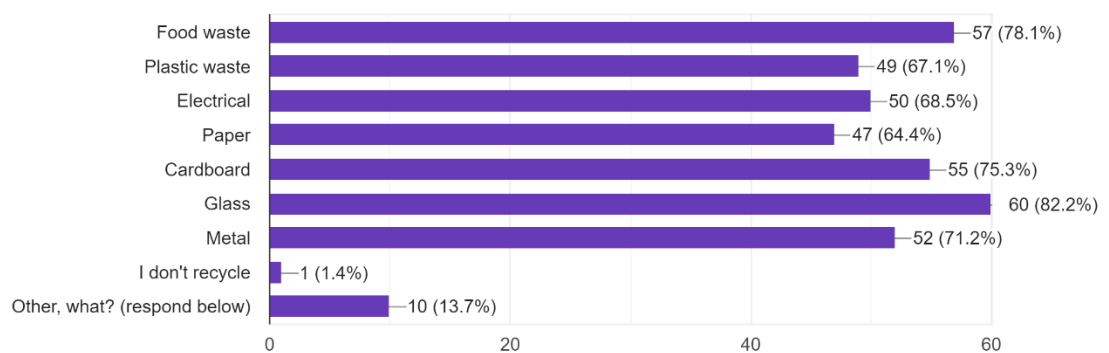


Figure 17. Recycling efforts question 3

It appeared that although the majority of the respondents recycle plastic waste, there could be room for improvement. As the figure above establishes, out of the 73

respondents, 49 recycle their plastic waste. From the choices, plastic waste came in the sixth place (67.1%).

Table 3. Other responses

1.	Clothes and other textiles
2.	Hazardous waste
3.	Textiles
4.	Batteries, pharmaceutical waste
5.	Fabrics
6.	Drugs
7.	Clothing
8.	Clothes
9.	Clothing
10.	Clothing, furniture and other home textiles, hazardous waste

The final question within this section was meant to discover the respondents habits regarding buying a plastic bag while shopping for groceries. This question is somewhat different to the other questions in this section but interesting, nonetheless.

Do you buy a plastic bag while shopping for groceries?

73 responses

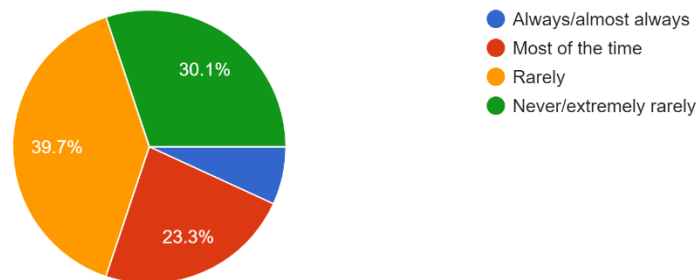


Figure 18. Buying plastic bags while grocery shopping

The majority of the responses were 'Never/extremely rarely' (39,7%) and 'Rarely' (39,7%). 23,3% responded 'Most of the time' and the rest (6,8%) responded 'Always/almost always'.

4.3 Motivation towards recycling plastics

The following questions involved motivation towards recycling plastics. There were two questions where one was meant for the respondents who recycle their plastics and the other for respondents who do not recycle their plastics. This might have caused some confusion for the respondents since previously discussed, 49 respondents recycled their plastic waste and in the upcoming question intended for people who recycle plastics had 52 responses. Fortunately, this does not affect the bigger picture that much.

The first question within this section was about the level of motivation towards recycling plastics. The choices were again from 1 to 5 where 1 equalled low motivation and 5 equalled high motivation.

What is your level of motivation towards recycling plastics? (from 1 low to 5 high)
73 responses

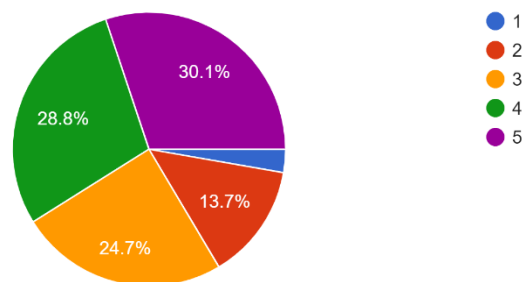


Figure 19. Motivation levels towards recycling plastics

As already discovered, the majority of the respondents recycle plastics. This can be verified from this question as well since the motivation to recycle plastics seemed to be high with the majority of respondents. It also demonstrates Johansson's (2016) recycling behaviour model that was discussed in chapter 2.6 in fact works. With high motivation levels to recycle, the higher the recycling outcomes can ultimately be. The recycling behaviour model of course requires simplicity for higher recycling outcomes, but motivation should not be left out of the picture. Simplicity towards recycling plastics will be discussed later on.

The next question was intended for the respondents who recycle their plastics. The respondents could choose all applicable choices and if not on the list of choices, they could answer on a separate section 'other, what?'. The question was meant to discover the reasons for why the respondents recycle plastics. Climate issues had the most responses with over 80%. Two responses that were written in the 'other' section were as follows: 1. Feels right, and 2. Because it's cheaper than mixed waste.

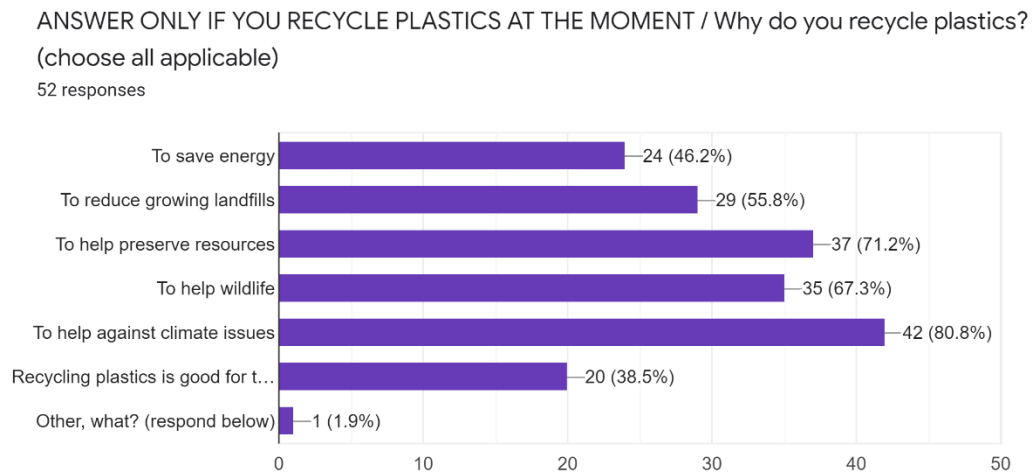


Figure 20. Reasons for recycling plastics

Moving on, the next question was intended for the respondents that do not recycle plastics. Here also, they had the chance to choose all applicable and if not on the list, they could write their responses in another section. Only one responded in that section with "I'm lazy".

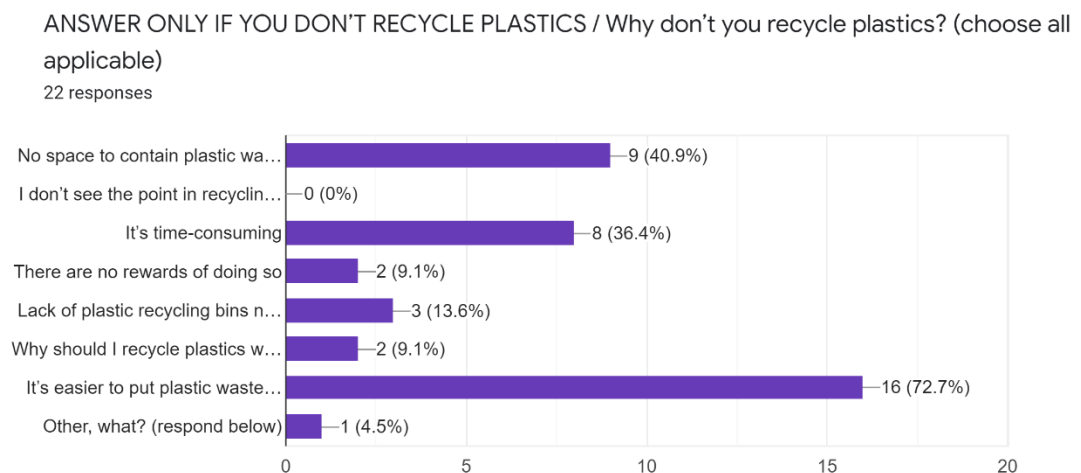


Figure 21. Reasons for not recycling plastics

The purpose of the question was to discover the reasons for why the respondents do not recycle plastics. The most responses, which was 16 was for the choice 'It's easier to put plastic waste with other rubbish (mixed waste)'. The second most picked choice with nine responses was 'No space to contain plastic waste in household'. Eight responses were 'It's time-consuming'. The responses can be interpreted in many ways. One interpretation could be that of simplicity and or lack of it. No space to contain your plastic waste for instance could be the reason that the respondents are of a younger generation and maybe their households aren't roomy enough to contain waste. Then again 16 responses were that it is just easier to put plastic waste with mixed waste. The reason that leads to this could be of many reasons, but one could be that it is just simpler to put it in the mixed waste.

'What is hindering you from recycling plastics even more?' was the next question. Unlike the previous two questions, this question was for all respondents. The graph created with Google Docs did not show the choices fully, so the author created the table below so that it would be clearer.

Table 4. "What is hindering you from recycling plastics even more?"

Choices	Response amount	%
No space to contain plastic waste in household	30	41.1%
It's time-consuming	18	24.7%
There are no rewards of doing so	7	9.6%
Why should I recycle plastics more when so many do even less?	3	4.1%

It's easier to put plastic waste with other rubbish (mixed waste)	30	41.1%
Other, what? (respond below)	14	19.2%

The highlighted numbers had the most responses. They were the same ones as in the previous question, only now there were also answers from the respondents that recycle plastics as well as who do not. The responses here also can be interpreted in many ways. Simplicity and or lack of it could be one interpretation now even more. There were 14 other responses for this question that can be seen in the table below. Some answers were written in Finnish so for this research paper, the author translated them in English as they were written.

Table 5. "What is hindering you from recycling plastics even more?" (Other responses)

1. "Before, the closest recycling facility was a few kilometres away, which slowed down recycling and recycling took space in the household"	2. "Nothing, I already recycle everything mentioned above"
3. "I already recycle everything"	4. "I don't have an easy (and non-water consuming) hack for cleaning dirty plastics. Otherwise I recycle all the plastic"
5. "I recycle it all"	6. "I still recycle even if it takes up a lot of space in my kitchen"
7. "I'm lazy"	8. "Motivation to recycle plastics is better if it is certain that the plastics will be utilized and not incinerated which is often the case"
9. "Not knowing if some can be recycled"	10. "Nothing" (x 2)
11. "Sometimes the confusion can I put the thing in plastic or not. I'm also a bit lazy cleaning dirty plastic containers"	12. "The plastic packaging must be cleaned before recycling it and sometimes there is no point to waste water to clean the packaging"
13. "It is sometimes difficult to "disassemble" some plastic packages to separate different types of plastic"	

Again, simplicity centres around most these responses. The cleaning of dirty packages, the “can I recycle this?”- confusion, difficulty to separate plastics, and not having a recycling facility near the household are all things that hinder recycling plastics.

4.4 Best practices in plastic recycling - evaluations and ideas

The first question in this section was about how simple the respondents find recycling plastics.

How simple do you as a consumer find recycling plastics?
73 responses

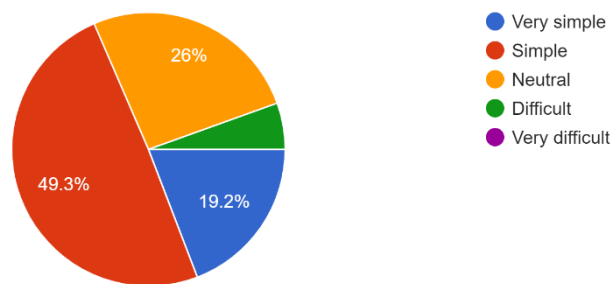


Figure 22. Simplicity of recycling plastics

As the figure above depicts, the majority of the respondents find recycling plastics a simple thing to do. Altogether, almost 70% saw the current ways for recycling plastics relatively simple for a consumer to do, where views of recycling complexity were very rare. Simplicity is an important factor regardless of the task and this will be further discussed later on in the conclusions and discussion chapter.

The next question in this section was to discover if the respondents were happy with the recycling processes within the city they live in. This question had three choices to choose from ‘Yes’, ‘No’, and ‘I’m not sure’. 57,5% responded ‘Yes’, 35,6% responded ‘I’m not sure’, and the rest responded ‘No’. This question was meant to get responses for the next two questions. The next two questions were: 1. If you chose yes

to the above question, why so? (27 responses) and 2. If you chose no to the above question, why so? (4 responses). The following two tables will display the responses to these questions. Some answers were in Finnish, so the author translated them in English. Also, minor typos were fixed but the answers remain the same in content.

Table 6. Respondent answers for choosing 'Yes'

1. "Because I am able to do so without any difficulties."	2. "Close stations"	3. "Even though there's only a few places it still works" (x2)
4. "For example, in student buildings, there is always an opportunity for plastic recycling"	5. "I have a possibility to recycle plastics very easily where I live"	6. "It's easy to find spots to drop the plastics off at"
7. "It's easy to recycle in Vantaa because there are plenty of Moloks in our area"	8. "It's easy because our housing association has plastic garbage bins"	9. "Jyväskylä has made plastic recycling easier by adding recycling bins near households"
10. "Jyväskylä just got plastic recycling bins so I'm happy about that"	11. "My place of residence is mainly for students so there are many places to recycle in"	12. "Needs more drop off spots"
13. "Overall Finland is great at recycling, pantti etc." (x2)	14. "Plastic bins are nearby"	15. "Plastic recycling bins have arrived to housing associations"
16. "A plastic recycling bin has arrived in my housing association, compared to the previous 3km trip to a recycling facility, this is easier now"	17. "There are enough plastic bins around. Anyhow, it could be different if I wasn't a student and living near the city centre"	18. "There are many plastic recycling bins nearby"
19. "There are recycling bins in nearby areas" (x2)	20. "There is a bin for plastics outside my house"	21. "We have many drop off spots nearby"
22. "We have own recycling bins outside the house. Earlier I had to take it further away.."	23. "We have plastic bins in block buildings. If you live in own separate house you can take plastic to recycling centres at stores etc. It's pretty easy"	24. "We just got plastic recycling bins to our apartments' yards"

Table 7. Respondent answers for choosing 'No'

1. I wish there were more clear instructions on how and what to put in the plastic recycling. I also wish there were more/bigger plastic recycling bins nearby.	2. Not familiar with the whole plastic recycling process.
3. Lack of plastic bins in Eco stations	4. Not enough recycling bins

Moving on, the next two questions had the same choices to answer with also an option to type an answer for their selves. The respondents were meant to choose one to three choices that they found most important. The list of answer choices were as follows:

- Education of plastics effect on the world
- More nearby drop off facilities
- More plastic recycling bins near households
- Simple instructions for recycling plastics for households
- Incentives (monetary or other)
- Government regulations
- Other, what? (respond below)

The above list helps in seeing the choices since in the figures below some of the choices cannot be seen fully.

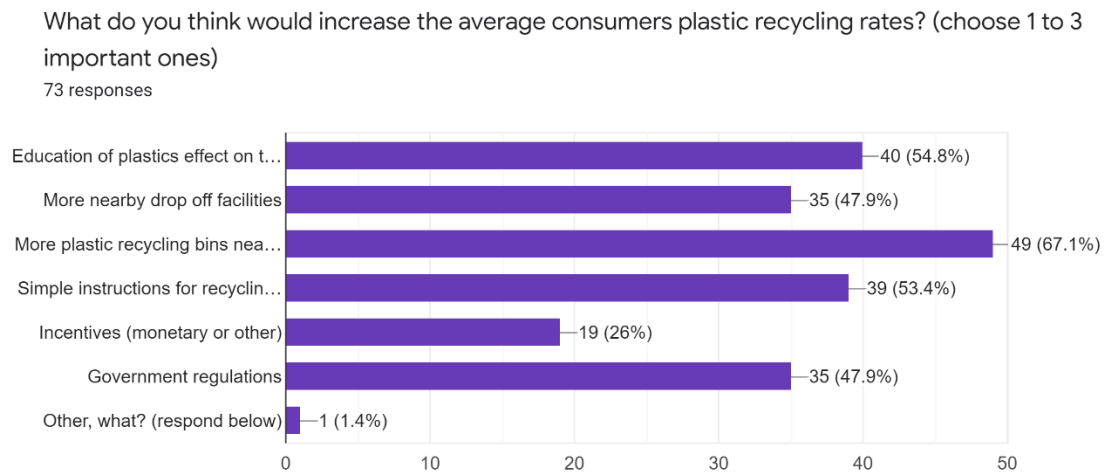


Figure 23. How to increase recycling rates question 1

The first question out of these two was to see what the respondents thought would increase the average consumers plastic recycling rates. The figure displays the number of responses each question had and also the percentages. The most responses went to 'More recycling bins near households' with 49 responses. Second most went to 'Education of plastics effect on the world' with 40 responses. Third most went to 'Simple instructions for recycling plastics for households' with 39 responses. Only one responded 'other' and the response was 'proper space to contain plastic waste in household'.

The second question out of the two was to see what would increase the respondents' own plastic recycling rates.

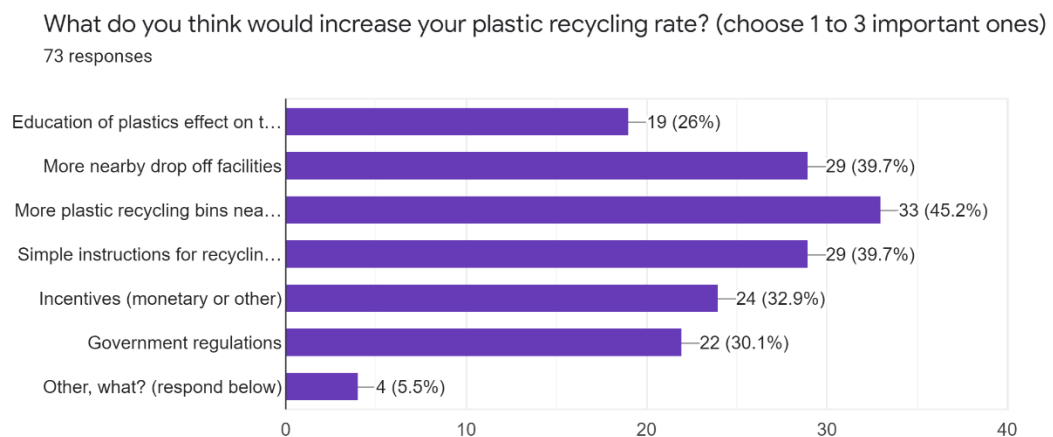


Figure 24. How to increase recycling rates question 2

Here the responses were a bit different. 'More recycling bins near households' had the most responses in this question as well with 33 responses. 'More nearby drop off facilities' and 'Simple instructions for recycling plastics for households' both had the second most responses with 29 each. 4 responded 'other' and the responses were as follows:

1. "Nothing, I think. I already recycle all my recyclable plastic waste"
2. "I think I recycle plastic already very well"
3. "I think I have enough knowledge, I am just lazy sometimes"
4. (translated from Finnish) "If some packages would clearly say it can be recycled as plastic"

One clear difference stood out between the two figures. In the first figure, education of plastics effects had over half the amount more of responses than in the second figure. Apparently the respondents find their selves to need less education of the effects plastic has on the world that in their minds the average consumer does.

4.5 Effects of family and education towards recycling

The first question in this section was about looking into the respondents' parents'/guardians' recycling habits while the respondents were growing up.

When you were growing up, did your parents/guardians recycle generally?

73 responses

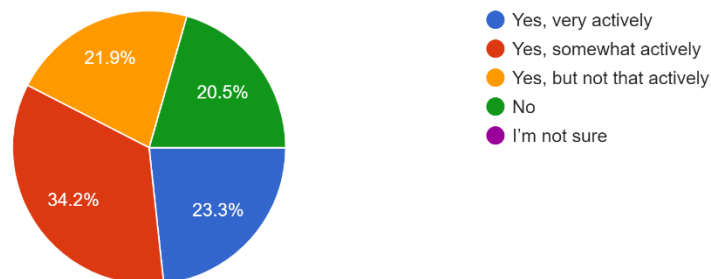


Figure 25. Parents/guardians recycling habits

As seen in the figure above, the respondents seemed to have some differences while growing up. The majority of the respondents' parents seemed to be into recycling while some did not recycle that actively and some did not recycle at all. Overall, the responses here were by the majority more positive towards recycling and the number of positive responses are comparable with the respondents who as well recycle their self. This of course is not confirmed in this research and will be discussed later on in the conclusions chapter.

The second question in this section was to see what the respondents thought about schools teaching about recycling.

Do you think recycling should be taught in schools?

73 responses

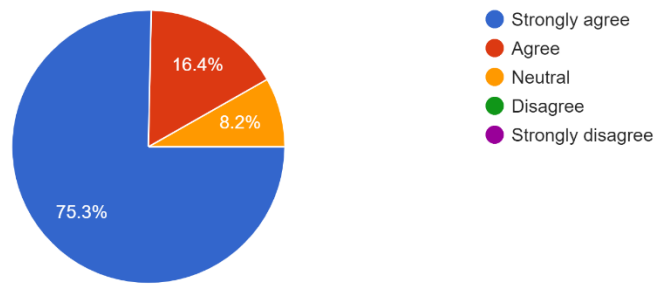


Figure 26. Recycling education in schools

None of the respondents thought negatively about this subject. In fact, $\frac{3}{4}$ strongly agreed with the matter. 16,4% chose 'Agree' and 8,2% had neutral thought regarding this question.

4.6 Towards better plastic recycling outcomes

Now for the last two questions for this research were again divided for the respondents to answer whether they do not recycle plastics and if they do recycle plastics actively. The question for the ones who do not recycle was meant to discover whether the respondents would begin recycling plastics in the near future.

ANSWER ONLY IF YOU DON'T RECYCLE PLASTICS AT THE MOMENT / Do you think you will begin recycling plastics anytime in the near future (within the next 3 years)?

22 responses

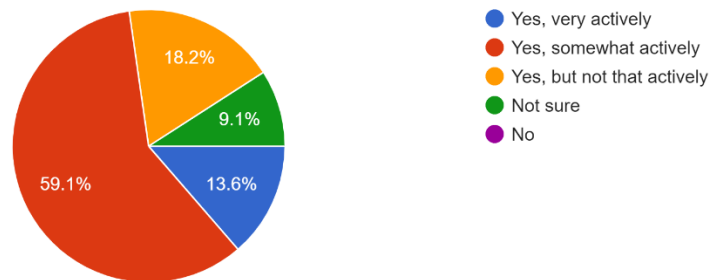


Figure 27. Beginning to recycle plastics in the near future

The responses were mostly positive. Out of the 22 respondents, 13 (59,1%) responded they would begin recycling somewhat actively and 3 (13,6%) would begin recycling very actively. 4 respondents (18,2%) would begin recycling but not that actively. 2 (9,1%) responded they were not sure would they begin recycling in the near future.

The last question was intended for the respondents who recycle their plastics actively. It was an open-ended question where the respondents could write their answers. The question was for the respondents to write down a message for the people who do not recycle plastics. Here again some responses were in Finnish, so the author translated them in English for it to be clear for this paper. The messages were as follows:

1. Come on its not hard you can do it! (x 3)
2. Come on man, just save the planet (x 2)
3. Think of the future generations and not just yourselves (x 2)
4. Just do it (x 2)
5. It aint that hard buddy
6. Recycling plastic is quite easy in my opinion so why not?
7. You would not enjoy living surrounded by waste and trash would you now? Treat your environment like your home, your body.. If you don't care about others, at least care about yourself.
8. It is not that hard generally, it also means you don't have to take out mixed waste as often. Think about the environmental benefits.
9. Find out what non-recycling does to the world
10. Just do it. There is no time. You're worthless if you don't recycle plastic. What are you doing right now? Just do it please!
11. After all, it isn't that hard to do if you'd be willing to do so
12. The more we recycle, the more efficiently the circular economy lifestyle can develop. Recycling is one step towards more sustainable future. Let's leave some resources for the future generations!
13. Do it, it's simple and helps the environment
14. Do it, recycling is not a choice it's our duty.
15. Your plastic food package could someday turn into a toothbrush. Don't waste the opportunity!
16. It is not so hard to do (in Finland, in cities), so why are you not doing this for our planet?
17. It's not that hard! And it nice to have only a little other garbage when you recycle plastics!
18. Its easy to do and should be done
19. Stop being selfish. It's easy.
20. Its not that hard to think about future generations
21. Its easy and good
22. Most of the mixed waste is usually plastic so it would be good to recycle plastic!
23. Its something that needs to be done in order for our world to last otherwise the wildlife will suffer
24. Recycling plastics is like wearing a mask. You are a bad person if you don't
25. Pls recycle thank, don't be selfish and do your part, it's not too hard
26. Recycling is free, easy, quick and good for the environment. A small thing to do with huge effects.
27. It really isn't that much of an effort, hard, or time-consuming
28. It's really easy, you should give it a try!
29. You should, because it has a huge environmental impact
30. Please do it

5 Conclusions and discussion

The results of this research have given an opportunity to look into the thoughts of younger generation consumers regarding recycling and more specifically, recycling plastics. The growing problems that plastic waste creates has the majority of the respondents concerned.

Generally, the results indicate that recycling plastics is something that the younger generation does without finding it to be too complex of a thing to do, although there would still be room and need for improvement. The whole recycling plastics process, while mostly seen as a simple process could still need some further improvements according to the results. The factors that are hindering the respondents from recycling plastics even more are things that the stakeholders within waste management value chain should act on. It is the younger generation that will continue in being a consumer of plastics in the future, so these hindering factors of recycling plastics should be fixed before it is again the next younger generation facing the same issues.

The results also show how the respondents view the “average consumer” and what they think would increase the average consumer’s plastic recycling rates. As it was already discussed in the results chapter, the things that the respondents think would increase plastic recycling rates are having more plastic recycling bins near households, education of plastics effect on the environment, and simple instructions for how to recycle plastics for households just to mention the ones with the most responses. These are also things that stakeholders within waste management value chain could and should look into in order to increase plastic recycling rates.

Simplicity and motivation play a key role in recycling rates, although simplicity is more important to some extent. Previous literature on the topic does in fact go along with the results in this research as well. Where recycling was seen as simple, around the same number of respondents in fact recycle their plastics when again the motivation levels towards recycling plastics, the higher motivation level responses were a bit lower than with the responses of who recycle their plastics. All in all, the motivation levels were on the higher end than the lower. These results indicate that if the

waste management value chain indeed works on improving plastic recycling outcomes by making it easier and simpler for the consumer, recycling rates would increase. Simplifying plastic recycling could also increase motivation levels to perform the task.

5.1 Answering the research questions

As the title of this paper describes, this study focused on plastic recycling. For this, the author felt it would be necessary to look into the current status relating to plastics and plastic recycling. Therefore, topics such as the effects plastics have on the environment, how plastic waste is managed generally and more specifically in Europe, a circular economy, and attitudes towards recycling were an important basis for studying younger generation consumers' attitudes and ideas towards recycling plastics.

The first research question out of the three was intended to be answered with previous secondary literature on the topic. The second and third were then again meant to be answered with the primary data surged from the survey. All in all, the research objectives were met, and the research questions answered.

5.1.1 Research question 1

What is the current situation of plastics and plastic recycling, specifically in Europe?

Since this questions topic was discussed and answered in the literature review, only bullet points are listed below since the literature review already provides the necessary knowledge on the subject:

- Mechanical recycling is for the moment almost the only method to recycle plastics in Europe.
- There are three ways of managing plastic waste: disposing, recycling, and incinerating. On a global level, plastics end up in landfills mostly. In Europe, landfilling had the lowest percentage out of the three ways of managing waste. Ultimately, this means that at least Europe is on the right path to reaching a circular economy of plastics.
- From 2006 to 2018 the amount of recycled plastic waste had doubled in Europe.

5.1.2 Research question 2

What are the motivations, attitudes, and pragmatic ideas of a younger generation towards plastic recycling?

The results indicate that the majority of the respondents are keen on recycling their plastic waste. In fact, around two out of three respondents recycle their plastics.

The respondents are mostly motivated to recycle their plastics and the reasons they recycle plastics are of their environmental concerns. Then again some respondents were not that keen on recycling their plastic waste. The reasons for this involves the simplicity of the whole process. The majority of the respondents who do not recycle their plastics responded that plastic waste is easier to put with other mixed waste and that there is not enough room to contain their plastic waste in their households. These were also the two biggest reasons that hinder all of the respondents from recycling even more of their plastics.

Out of all the 73 respondents, 50 respondents find recycling plastics either simple or very simple. Now looking back at Johansson's (2016) recycling behaviour model that was discussed in chapter 2.6, simplicity towards a task is an important factor for it to be executed. This can be confirmed with the results since as revealed earlier, 49 respondents in fact recycle their plastic waste.

All in all, the respondents who are of a younger generation of consumers find recycling plastic an important thing to do, they are mostly motivated to do so, they think it is a simple enough thing to do, but they think that more should be done due to having the environment in mind.

5.1.3 Research question 3

What should happen within waste management value chain to improve plastic recycling practices and outcomes?

Just as the results indicate, the younger generation is concerned of the environment and the impact plastic waste has on it. Although the majority of the respondents recycle their plastics, many do not. According to the results, while the respondents compared their general recycling efforts to their ideas of an average consumers habits, the respondents thought that their recycling efforts are higher than the average consumers.

The most important things that the respondents think would increase the average consumers plastic recycling rates were:

1. More plastic recycling bins near households
2. Education of plastics effect on the world
3. Simple instructions for recycling plastics for households
4. Education of plastics effect on the world
5. Government regulations

Listed above are things that the stakeholders and waste management value chain could work on which could ultimately increase recycling rates. All things considered, the younger generation's plastic recycling efforts are noticeable but further improvements are still needed so that more people would begin recycling plastics as well.

5.2 Assessment of research process and result quality

5.2.1 Reliability and validity

Litwin (1995) noted that whenever you collect data, for example, with a survey, there is going to be some amount of error, and reliability is of how reproducible the survey instrument's data are. With survey research there can be random error and measurement error. Random error, as the name hints, is an error that is unpredictable and that happens in all research. Measurement error is of how well or bad a measurement instrument used for research performs.

As this research was about the current attitudes and ideas of younger generation consumers towards recycling plastics, the author suspects that if the same survey was sent out again to the same sample for example two weeks later, the results would most likely be mostly the same since attitudes towards things may not change that quickly. The results would most likely have some measurement error though, as the results had some initially as well (people may not always pay attention while filling in a survey).

What goes to the validity of this research, collecting primary data with the survey was the best tool to help reach a large enough sample and it allowed the author to ask multiple questions that were related either directly or indirectly to the research topic. According to Litwin (1995), once the reliability of a survey has been determined, the next step is to assess the validity of it as well which means determining how well does the survey in fact measure what was set out to be measured. The questions in the survey were formed as simple as possible and as it was meant to look into the younger generation consumers' attitudes towards recycling plastics, the questions were as already mentioned related to the topic, hence the validity checks out.

5.2.2 Reflection of research process

All things considered, the whole research process was smooth right from the beginning. The process was well planned before starting the actual research and the amount of time needed was well thought of.

The author found collecting secondary literature to be the most challenging part of the research for having to narrow down a large field relating to recycling plastics, which was very time consuming. Academic literature on plastic recycling in general was found to be somewhat scarce and considering the nature of this specific research, topics such as circularity, a circular economy, plastic waste management, and attitudes towards recycling were looked into more in depth. These topics helped with proceeding with this research for they have a similar relationship with this specific research topic. Furthermore, the choices and methods explained in the methodology chapter helped in providing additional insights for this research.

The survey for this research was made in a way that would not be problematic for the respondents to answer. The survey was also sent out in the beginning of the week to avoid people not answering to it that for example some might have otherwise done if it was dispatched during the weekend. It was also a relatively short survey which by its length would reduce respondents getting frustrated to answer the questions. By reducing the risk of respondents getting frustrated hopefully lead to honest and representable answers.

The questions within the survey were formed in a neutral way and no further questions were added once sending out the survey. The author wanted to reduce dishonest answers by asking questions in an unbiased way. It cannot be confirmed a 100% that if the respondents felt guilty about answering questions of their recycling habits too negatively and answered more positively instead. Then again, the survey was anonymous, hence, respondents should not have felt the need to give dishonest answers as the questions were formed in a neutral way, personal views of the author remained unbiased and the possibility for the respondents to answer in favour of the author was not possible.

5.3 Limitations of the research

This research was intended towards a younger generation of people regardless of the background. Then again, as the survey was sent out in Finland, the majority of the responses were as well from Finnish people, meaning this research mostly represents the topic in a Finnish point of view. With this in mind, any straightforward conclusions of other populations for example would be uncertain. Then again, as environmental issues are global issues and of concern to everyone, the results of this research could be used to help improve plastic recycling outcomes outside of the studied context of this research as well as inside of it.

Furthermore, as the results from the survey were analysed on a descriptive statistical level, the results are indicative in a way that noticeable differences, for example the background of the respondents' parents and their recycling habits and its possible effect on the respondents' recycling habits, were not analysed on a deeper statistical

analysis level. Hence, analysing on a descriptive statistical level only and not on a deeper level was a limitation of itself.

5.4 Suggestions for future research

This research alone, while discovering valuable insights of the minds of a younger generation towards plastic recycling could in fact benefit more by reaching a larger sample of respondents. As well, as this research involved people mostly living in Finland, reaching people from around the world could open up possibilities to look into other cultures and their effects on peoples' recycling habits and of course, the possibility to compare the results from different backgrounds. With a larger and global sample, deeper statistical analysis could be used to open up more of the subject than on a descriptive statistical level as used in this research, therefore, deeper statistical analysis could help reveal the patterns observed in this research with even more preciseness.

The question "When you were growing up, did your parents/guardians recycle generally?" for instance would have been interesting to have a deeper analysis since the numbers were similar between the respondents who were keen towards recycling with the respondents' parents' positive recycling habits. Whether these people were exactly the same, cannot be stated via this analysis. It would need additional analysis and perhaps a larger sample that would support the relationship of background and ones' current attitudes and habits. Also, background should not be seen as a determining factor, new generations can learn from the mistakes of the previous ones, at least in theory.

With environmental issues in mind, researching peoples' attitudes towards recycling, what they do and do not do, and what they want can lead to better recycling outcomes. Hence, further research on the subject on a broader and deeper level is needed and would be beneficial for helping the environment.

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Appendices

Appendix 1. Questionnaire

1. Gender?

- Female
- Male
- Other
- Don't want to specify

2. Age?

- 19-21
- 22-24
- 25-27
- 28-30

3. Nationality

- Finnish
- Other European (EU-countries + Switzerland, Norway, UK)
- Non-European

4. Current location of residence?

- Finland
- Other European (EU-countries + Switzerland, Norway, UK)
- Non-European

5. Are you currently?

- A student
- A student and working
- Working

6. How would you describe your own recycling efforts compared to your idea of an average consumer's recycling habits? (from 1 low to 5 high)

- 1
- 2
- 3
- 4
- 5

7. How would you describe your own recycling efforts compared to most of your peers (friends and colleagues, etc.) of your age group? (from 1 low to 5 high)

- 1
- 2
- 3
- 4
- 5

8. What do you recycle generally? (choose 1 or more)

- Food waste
- Plastic waste
- Electrical
- Paper
- Cardboard
- Glass
- Metal
- I don't recycle
- Other, what? (respond below)

If you chose other, answer here

Short answer text

9. What is your level of motivation towards recycling plastics? (from 1 low to 5 high)

- 1
- 2
- 3
- 4
- 5

10. ANSWER ONLY IF YOU RECYCLE PLASTICS AT THE MOMENT / Why do you recycle plastics? (choose all applicable)

- To save energy
- To reduce growing landfills
- To help preserve resources
- To help wildlife
- To help against climate issues
- Recycling plastics is good for the economy
- Other, what? (respond below)

If you chose other, answer here

Short answer text

11. ANSWER ONLY IF YOU DON'T RECYCLE PLASTICS / Why don't you recycle plastics?
(choose all applicable)

- No space to contain plastic waste in household
- I don't see the point in recycling plastics
- It's time-consuming
- There are no rewards of doing so
- Lack of plastic recycling bins near household
- Why should I recycle when so many others don't either?
- It's easier to put plastic waste with other rubbish (with mixed waste)
- Other, what? (respond below)

If you chose other, answer here

Short answer text

12. What is hindering you from recycling plastics even more?

- No space to contain plastic waste in household
- It's time-consuming
- There are no rewards of doing so
- Lack of plastic recycling bins near household
- Why should I recycle more when so many people do even less?
- It's easier to put plastic waste with other rubbish (with mixed waste)
- Other, what (respond below)

If you chose other, answer here

Short answer text

13. Do you buy a plastic bag while shopping for groceries?

- Always/almost always
- Most of the time
- Rarely
- Never/extremely rarely

14. When you were growing up, did your parents/guardians recycle generally?

- Yes, very actively
- Yes, somewhat actively
- Yes, but not that actively
- No
- I'm not sure

15. How simple do you as a consumer find recycling plastics?

- Very simple
- Simple
- Neutral
- Difficult
- Very difficult

16. Are you happy with the plastic recycling procedures within the city you live in?

- Yes
- No
- I'm not sure

If you chose yes to the above question, why so?

Short answer text

If you chose no to the above question, why so?

Short answer text

17. What do you think would increase the average consumers plastic recycling rates?
(choose 1 to 3 important ones)

- Education of plastics effect on the world
- More nearby drop off facilities
- More plastic recycling bins near households
- Simple instructions for recycling plastics for households
- Incentives (monetary or other)
- Government regulations
- Other, what? (respond below)

If you chose other, answer here

Short answer text

18. What do you think would increase your plastic recycling rate? (choose 1 to 3 important ones)

- Education of plastics effect on the world
- More nearby drop off facilities
- More plastic recycling bins near households
- Simple instructions for recycling plastics for households
- Incentives (monetary or other)
- Government regulations
- Other, what? (respond below)

If you chose other, answer here

Short answer text

19. Do you think recycling should be taught in schools?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly agree

20. ANSWER ONLY IF YOU DON'T RECYCLE PLASTICS AT THE MOMENT / Do you think you will begin recycling plastics anytime in the near future (within the next 3 years)?

- Yes, very actively
- Yes, somewhat actively
- Yes, but not that actively
- Not sure
- No

21. ANSWER ONLY IF YOU RECYCLE PLASTICS ACTIVELY / If you recycle plastics actively, what message would you have for someone who doesn't recycle plastics?

Long answer text