

MSc. Strategic Product Design  
Faculty of Industrial Design Engineering  
Delft University of Technology

MASTER THESIS



# Enhancing consumers' acceptance of products made of recycled plastics

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# *Enhancing consumers' acceptance of products made of recycled plastic*

## **Master Thesis**

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# Executive Summary

Plastic pollution is one of many environmental problems. Almost 91% of the plastic waste never makes it to the trash bin and ends up in nature, hence not recycled (Parker, 2020). To make the world a better place by 2030, the Sustainable Development Goals were defined by the United Nations. This project focuses on Goal 12, *ensure sustainable consumption and production patterns*, and goal 13, *take urgent action to combat climate change and its impacts* (United Nations General Assembly, 2015).

The graduation project is part of the Interreg North-West Europe TRANSFORM-CE project. The TRANSFORM-CE project aims to convert/recycle all types of single-use plastics, also the low-quality (e.g. foils, plastic bags), into new valuable products, providing an alternative for virgin plastic. In order to stimulate the demand for recycled plastic, research from a consumer perspective is needed to adapt to the needs of consumers. Therefore, this graduation project investigates how consumers perceive products made of recycled plastic and how consumers' acceptance of products made of recycled plastic can be enhanced.

To find an answer to those questions, multiple methods were used. First, a pressure cooker was conducted to kick-start the project and better understand the overall consumer perception of recycled products.

Furthermore, a literature study was performed to get insight into the current consumer evaluation of products made of recycled plastic. The Engel-Kollat-Blackwell model (EKB model) was used to describe the psychological decision-making process of consumers. By investigating the search and the evaluation of alternatives stage of the EKB model, barriers (*lack of familiarity, lack of knowledge and cognitive capacity*), risks (*the perceived safety, contamination, quality, the perception of financial risk, and cynicism of consumers*) and benefits (*environmental benefits plus the deriving psychological benefits, anticipated conscience, and social benefits*) that consumers experience with products made of recycled plastic were identified. Besides, strategies (*nudges, a tangible future, social influences and brand recognition*) for sustainable consumer behaviour were investigated as potential strategies to limit the barriers, mitigate the perceived barriers and emphasise the benefits of products made of recycled plastic to stimulate a positive purchase intention among consumers.

Subsequently, the Context Mapping method, a qualitative user research method, was applied to discover the deeper layer of those barriers, benefits and risks. By generative sessions with six participants, the study focused on researching how products made of recycled plastic are experienced by students living in the Netherlands. A qualitative analysis was used to formulate a framework providing an understanding of the students' past and present experiences with products made of recycled plastic, the context in which these experience take place, and opportunities to improve students' future experiences with products made of recycled plastic.

Based on the insights from the pressure cooker, the literature review and the qualitative user research, eight design recommendations for enhancing the consumers' acceptance of products made of recycled plastic were formulated, and stimulating a positive purchase decision for products made of recycled plastic: *Inform about product details, make it attractive, make it fun, create social influence, make it tangible, stimulate try-out experience, stimulate familiarity, and build trust*. The

following vision statement was created to grasp the essential interaction with products made of recycled plastic and as an inspiration for ideation: *"Make the benefits of products made of recycled plastic more tangible in a fun, informative experience."*

The design recommendations and vision statement were incorporated in the ideation phase. The ideation phase consisted of several individual and duo brainstorm activities to generate ideas on how the design recommendations could be applied in real-life situations, resulting in the following idea clusters: *a simulation avatar, an experience museum, treasure hunt in the city, a big expo event, and a plastic drive-through*.

Iterations on the idea clusters and design recommendations were made on how these could be applied in the context of the municipality of Almere and Save Plastics, two key partners of the TRANSFORM-CE program. In the city of Almere, the green plastic plant is built. In this green plastic plant, municipal plastic waste of the city of Almere is transformed in collaboration with Save Plastics into products for the public space and housing construction, enabling a circular plastic waste stream. The concepts of the plastic route and a pop-up experience information centre were discussed and evaluated with the municipality of Almere.

After a final iteration incorporating the insights from the evaluation with the municipality of Almere, a future vision describing where the municipality of Almere and Save Plastics wants to be in the future, and a mission statement, describing how they will obtain this future vision, were defined. This future vision is as follows: *"The municipality of Almere and Save Plastics will be leaders/ frontrunners (in the Netherlands) in the transition to a circular plastic waste stream; All waste plastic, also the low-quality plastics (mix plastics), will be repurposed into new valuable products on a local level, ensuring sustainable consumption and production of plastic."* With as mission statement: *"making benefits of products made of recycled plastic tangible in a fun, informative experience to the broader public, making recycled plastic the standard norm."*

A roadmap for the municipality of Almere and Save Plastics is developed, describing a step-by-step plan over three horizons towards the future vision. In the first horizon, an urban game route is implemented for the Green Strip, the route towards the Floriade Expo 2022 that will take place in the city of Almere. The urban game route entails a treasure hunt game for products made of recycled plastic located in the city of Almere. In the second horizon, a pop-up experience museum is integrated alongside the urban game route. The pop-up experience museum will expose products made of recycled plastic in an expressive way in which visitors can experience the products themselves and encounter the possibilities and applications of recycled plastic. The third horizon focuses on scaling the pop-up experience museum to other municipalities and events, spreading the story of the green plastic plant and a circular municipal plastic waste stream. Besides, an ambassador program is started to create a supportive community for products made of recycled plastic, boosting the consumers' acceptance of products made of recycled plastic and driving the transition movement towards recycled plastic as the standard norm for production

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## 1. INTRODUCTION

This chapter provides an introduction to the context of the research of this graduation project. It explains plastic pollution and its impact on the environment. Furthermore, the problem statement is defined. Lastly, the design approach of this project will be discussed.

### 1.1. Environmental problems and plastic pollution

The world is facing many environmental problems. One of the problems is the plastic soup, as the oceans became a large dump for plastic. Humans and their consumption are responsible for this pollution. Sustainability is a big topic of discussion and the way people consume goods has to change as this impacts the environment. Sustainability can be defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (UNESCO, 2015). The United Nations formulated 17 Sustainable Development goals as a call to action to make the world a better place in 2030. This graduation project aims to contribute mainly to Goal 12, ensure sustainable consumption and production patterns, and goal 13, take urgent action to combat climate change and its impacts (United Nations General Assembly, 2015).

Part of goal 12 of the sustainable development goals by the United Nations is to substantially reduce waste generation through prevention, reduction, recycling and reuse by 2030 (United Nations General Assembly, 2015). Every year, around 490 kilos of household waste is produced per person in the Netherlands (Milieu Centraal, 2018), and a large part of this waste ends up in nature or is incinerated, which is not beneficial for the environment. Recycling this (plastic) waste can help to reduce the amount that ends up in nature and is incinerated. Recycling plastic is the process of transforming waste plastic materials into new objects and materials. This process can contribute to reducing the amount of raw

‘virgin’ plastic that is produced. Improving the reuse of “waste” resources is essential to reduce the impact on the environment.

Over the past half-century, there has been a dramatic increase in using plastics in products, packaging and cosmetics (Plastic Fantastic, 2019). The popularity of plastic is mainly due to the fact that it is cheap, strong, easy to make and mouldable in every desired shape. This makes the use of plastic in products very appealing as it will last a long time. Simultaneously, this is also the downside of plastic, as when it becomes waste, it does not degrade. Almost 91% of this plastic waste never made it to the trash bin and ended up in nature or is dumped (Parker, 2020) hence not recycled. Half of the plastic that is being produced becomes waste within one year. The lifetime of plastic is much less than other produced materials. For example, half of the steel that is being produced is used in construction applications, where it has a lifetime of a few decades. ( Geyer, Jambeck & Law, 2017). An aspect contributing to this lower lifetime is that most of these plastics are single-use plastic, such as plastic bags, water bottles and foils (Iberdrola, 2019). They are thrown away after using them once.

Therefore, increasing the demand for recycled plastics is important. Consumers generally have positive associations toward companies producing products with recycled material from plastic bottles (Meng & Leary, 2019) and increasingly show a high intention in consuming sustainable products, they fail to engage in the actual purchase behaviour of the products (Park & Lin, 2018). An understanding of what factors influence this inconsistency in consumers’ intention and actual behaviour

is needed in order to design strategies that stimulate the actual purchase of the products made of recycled plastic. Consequently, there is not enough demand for recycled plastics by businesses, and it is not seen as a valuable resource to exploit as the processing of recycled plastics costs more than virgin materials (Bucknall, 2020). Products made of recycled plastics are only successful if consumers are willing to adopt these kinds of products. Hence, consumers’ acceptance of products made of recycled plastic is necessary to increase the demand for recycled plastic and obtain viable business models (Calvo-Porral & Lévy-Mangin, 2020).

### 1.2. Problem definition

Consuming products made of recycled plastic is a step towards a more circular, sustainable way of consumption and reduces the environmental impact plastic pollution has on the earth. To make this a success, the uptake of recycled plastics by businesses and consumers needs to be enhanced. Although consumers show a high purchase intention for sustainable products, some problems can be identified that negatively influence the actual purchase and acceptance of products made of recycled plastic.

Firstly, consumers perceive plastic products to have little value, which results in the view that the costs for plastics should be as low as possible (Bucknall, 2020). Bucknall (2020) also states that because of the perceived little value of plastic, consumers expect it can be disposed of after using once since the materials are cheap. Also, consumers perceive products made of recycled materials as inferior to products made of new materials (Hamzaoui-Essoussi & Linton, 2014).

Besides, consumers are not familiar with the use of recycled plastic materials in products and may lack knowledge about the products, which makes them evaluate the products differently compared to products made of virgin materials (Hamzaoui-Essoussi & Linton, 2010). Therefore, consumers perceive risks in products made of recycled plastic. For example, safety: consumers perceive products made of recycled plastic as less safe compared to products made of “new” materials (Sun, Teh, & Linton, 2018). Also, consumers perceive environmentally greener products

automatically as being of lower quality, regardless of the price (Newman et al., 2014).

Research from a consumer perspective is crucial to understand why consumers perceive products made of recycled plastics as having less value and why they perceive risks. This understanding is needed to design strategies on how to fulfil the wishes and needs of consumers (Niinimäki & Hassi, 2011) and improve consumers' evaluation of products made of recycled plastic and increase the purchase behaviour.

1.3. Design Approach

The process of this graduation project can almost be described by the Double Diamond. The Double Diamond is a simple visualization created by Design Council in 2003 to describe the steps taken in a design or innovation project (Ball, 2019). To illustrate the process this project follows, a modified version of the double diamond is created to explain the steps. This visualization is depicted in Figure 1. The basic principle of the diamonds is that a diverging phase in which the issue is explored more widely is followed by a converging phase in which decisions and selections are made to narrow down and on how to proceed.

Pressure cooker

To kick-start the graduation project, a pressure cooker was conducted in the first week, in which all the steps of a “normal” design process were taken in just one week. The pressure cooker explored consumers' perceptions of recycled (plastic) products. This resulted in insights that were interesting to investigate further and a first strategy to increase consumers' acceptance of products made of recycled plastic. The decision to conduct a pressure cooker was made as experience in previous projects taught me this is a good technique to gain a first orientation and understanding of a project's problem and solution space.

Discover

During the discover step, research was conducted to achieve a deep understanding of the current situation and challenge of the graduation project. A literature study was done to explore consumers' decision-making process and identify

important factors that influence consumers' evaluation of products made of recycled plastic. Also, qualitative user research (Context Mapping) was conducted to empathize with the consumer and gain additional knowledge. The focus of the research activities is depicted in Figure 2 as three layers.

Define

During the define step, all the gathered information is synthesised. The research was analysed in a qualitative way. A cluster analysis was done to indicate overlapping or contrasting patterns. A framework was created to visualize the findings. The findings were interpreted, resulting in design recommendations and a design

vision on how to improve consumers' evaluation of products made of recycled plastic.

Develop

With the design vision and recommendations defined, it was time to develop solutions in line with the vision and recommendations. Several brainstorming and ideation activities were conducted, individually and together with a fellow Strategic Product Design student, to generate ideas. This was an iterative process in which the ideas were evaluated, and new ideas or changes were added. The loop arrow indicates the iterative manner

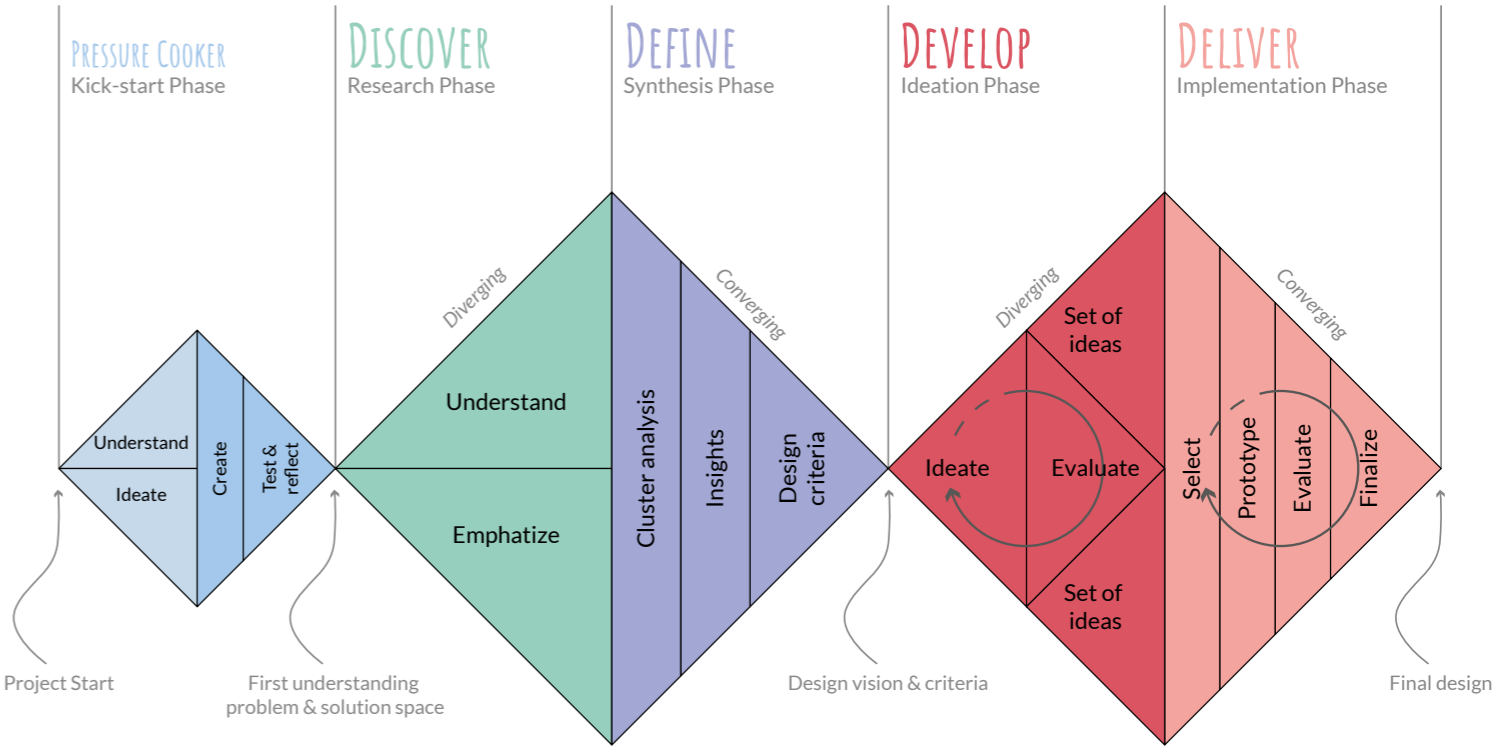


Figure 1: Visualization of the design process

in Figure 1. The process resulted in a set of possible ideas for a solution.

**Deliver**

In the deliver step, concepts were selected, following from the ideas. These concepts were evaluated with the municipality of Almere. A closer look was taken on how to implement these concepts with/for the municipality of Almere and Save Plastics. In an iterative way, implementation steps that needed to be taken were described and visualized in a roadmap. All the feedback and remarks were taken into account, converging into the final design of the strategy for enhancing consumers' acceptance of products made of recycled plastic.

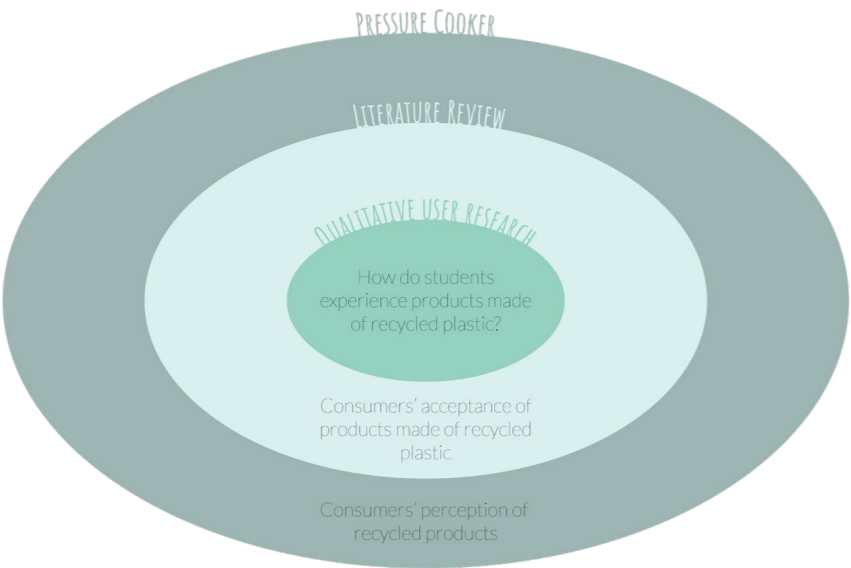


Figure 2: The layers of research





## 2. PRESSURE COOKER

In the first week of the project, a pressure cooker was executed to kick start my graduation project. The idea of a pressure cooker is to accelerate through all phases of a design process, from problem to solution, in a short period of time.

2.1. Introduction goal and setup

The goal of the pressure cooker was to kick start my graduation process about consumers' acceptance of products made of recycled plastic. This method forced me to start exploration and learning and to make decisions fast. In four days, a complete result is created, which can be analyzed and reflected upon. Due to the short period of time, it is harder to go in-depth, but it is a great way to investigate the possibilities and difficulties of the project. Also, the time pressure is good to get quick results and stimulate creative energy. The pressure cooker process can be compared to the Design Sprint. The process of the pressure cooker is divided into four days:

- Day 1: Understand.  
The problem was investigated, and literature and user research was done.
- Day 2: Ideation  
Ideas were generated based on the research of the previous day. At the end of the day, the best ideas are chosen
- Day 3: Creating  
The ideas are translated into a concept
- Day 4: Test/reflect  
The concept is tested and reflected upon.

The goal of this pressure cooker was to give the first possible answer to the following question: "how to enhance the acceptance of recycled plastic products by consumers and business". In the following sections, the execution of the days of the pressure cooker is explained.

2.2. Understanding

The first day of the pressure cooker was all about understanding the problem and the situation. An assumption map was made to map the assumptions and expectations of products made of recycled plastic and recycled plastic in general. This assumption map was used to do more research on people's perception of recycled products (Figure 3) and the factors that influence this perception to understand the consumer behaviour.

A literature study was combined with short user research on social media. Polls on my personal account of the social media platform Instagram were used to receive people's opinions and input. The following questions are asked in the polls and are inspired by Sun et al. (2018):

1. Do you consider yourself familiar with products made of recycled materials?
2. Are you interested in recycled products in general?
3. Do you think recycled products bring any risks?
4. Recycled products can contribute to the protection of the environment.

The questions could be answered with 'yes' or 'no'. Also, there was a possibility to elaborate on the answer in a text field. An example of how these polls looked like can be found in Figure 4.

2.2.1.

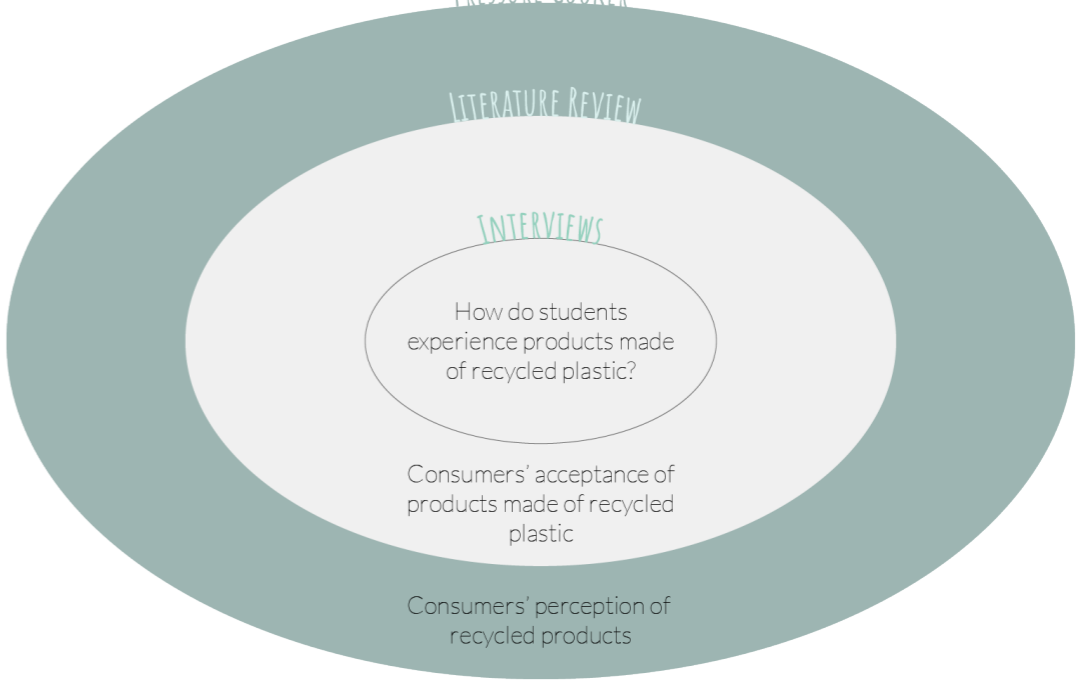


Figure 3: Pressure Cooker layer

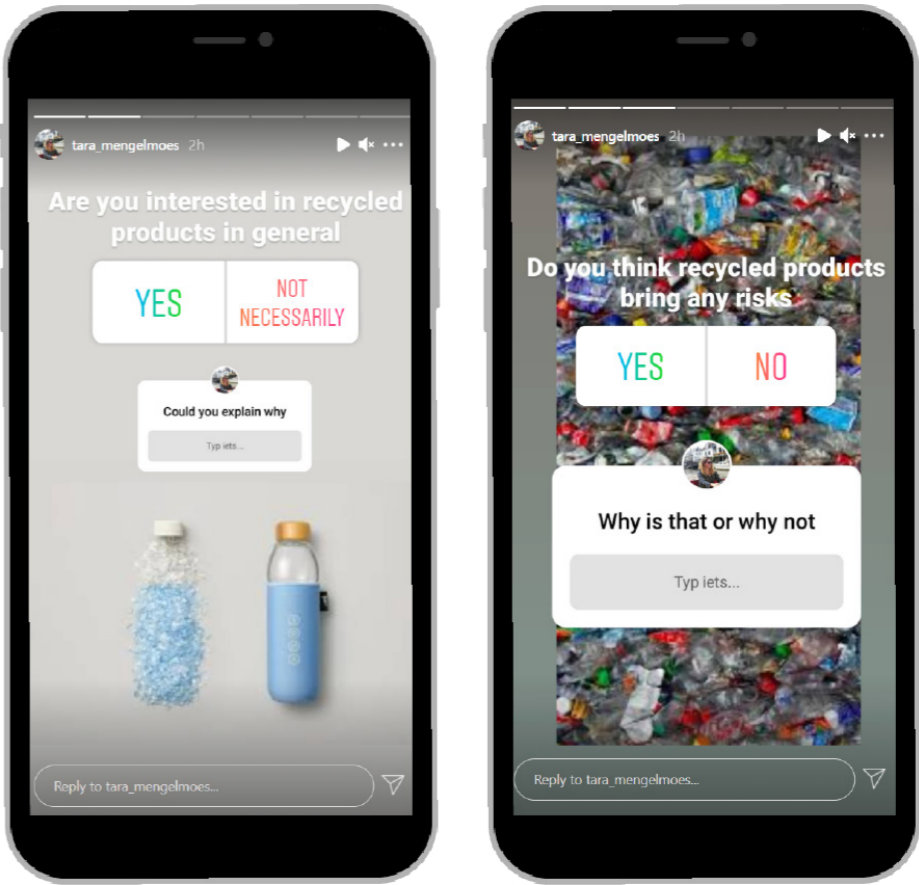


Figure 4: Example of polls on Instagram

2.2.2. Instagram poll results

The participation in the Instagram polls worked surprisingly well. Around 90 people responded to the questions. Table 1 shows the results of the four poll questions.

Additionally, some respondents elaborated on their answers. Some interesting answers are listed below. The complete list of answers can be found in appendix A.

1. Are you interested in recycled products in general?:
- “If it is better for the environment and easy to use, then why not!”
  - “Great for the environment, but not interested in a recycled ‘look’ “
  - “It makes me feel less guilty about my buying behaviour.”
  - “ Those things are most of the time more expensive. If the price is the same, this does have my preference.”

2. Do you think recycled products bring any risks?
- “Recycling cannot be an end in itself. It has to produce less carbon dioxide than waste disposal.”
  - “There is the risk that everything with the label ‘recycled’ is good for the environment when there are also bad ways.”
  - “There are strict rules to prevent risks.”
3. Recycled products can contribute to the protection of the environment.
- “Yes and no. It depends on what recycled products are made of, what their recycling process is etc. but to be honest, recycled products quickly feel to me as a cheap marketing tool. When it is possible to reuse products, I will always favour that over created new products out of used materials.”
  - “I would say “THE USE OF recycled products can contribute to...” and not the product itself”

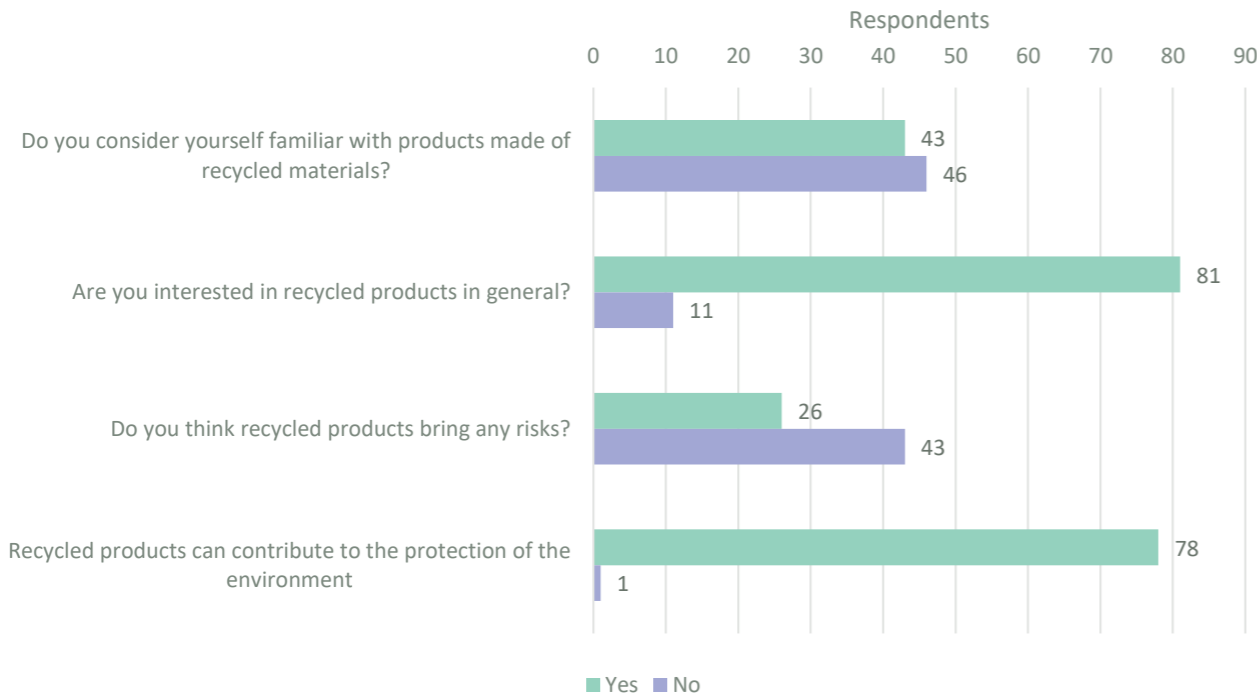


Table 1: Instagram poll results

2.2.3. Conclusions of the research

Combining the literature research and the results of the Instagram polls, some interesting insights could be found.

- People are aware that recycling is more environmentally friendly and want to contribute to this, but consuming less is the first step. If it is possible to reuse a product, this has their preference. Buying recycled products make people feel less guilty about their consuming behaviour.
- Half of the respondents do not feel familiar with recycled products. They have no idea where it is used or where they can find it. This is in line with Essoussi & Linton (2010), who stated that the lack of familiarity with the use of recycled materials in products influences the willingness to pay a price premium.
- Consumers are generally positive about products made of ocean plastic (Magnier et al., 2019).
- Consumers only buy if they believe the quality, functionalities and price of the more sustainable product is the same, but automatically consumers believe the quality of a product made of recycled plastic is lower than “virgin” plastic ( Newman, Gorlin & Dhar ,2014).
- Some people are cautious about using the “recycled stamp”. It quickly feels like a marketing tool. This is called greenwashing; this concept will be elaborated upon in the literature review.
- Also, according to the Instagram polls, people are less interested in the “recycled” or “eco” look recycled products often have.

### 2.3. Ideate

The second day of the pressure cooker was ideating and generating ideas. Based on the conclusions of day one, a set of “How To” (H2) questions were formulated to convert the challenges into opportunities (Tassoul, 2009). Multiple brainstorm sessions are done around these H2 questions, which can be found in Figure 5.

After brainstorming on the H2 questions, four ideas were visualized that combined some of the H2 questions. These visualizations can be found in Appendix A: Pressure cooker. The interesting elements of the ideas are listed below:

- Raising collective awareness (within a company)
- Providing a subscription model and give people the opportunity to test products made of recycled plastic in different categories.
- Higher awareness and familiarity for products made of recycled plastic is created since it is located in a public space. This is also an opportunity for the municipality to show off their contribution to a greener city and to find a partnership/sponsorship with big companies
- Prototypes of recycled plastic are exhibited in a public area of the city. In this way, people can experience the products and vote for their number one.



Figure 5:Brainstorm on H2 questions

## 2.4. Create

On day three, the ideas were combined into a concept, and a prototype of the concept was created.

Within this concept, two system processes can be identified. The first system is the voting process, in which citizens and designers can send in ideas that will be displayed on a platform. These same citizens of a municipality can also vote for the best idea. The second system is the subscription system. Consumers can

subscribe to get the winning products. These products are manufactured using the locally collected plastic of the city. After usage, the product can be returned to the manufacturer and reused or recycled into a new product.

Both systems can be combined in a closed loop. Iterating and trying different versions of the loop resulted in the final concept prototype with the citizens and the winning idea central (see in Figure 6).

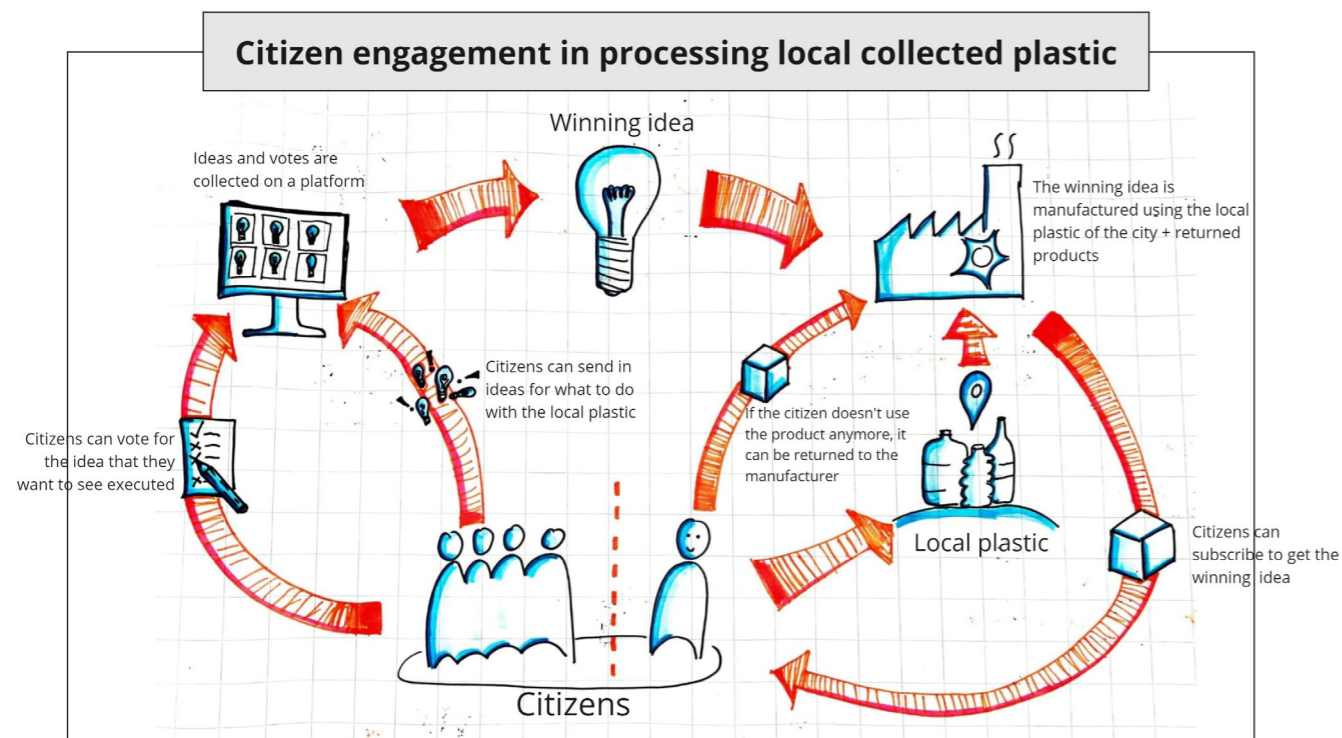


Figure 6: Pressure cooker final concept

## 2.5. Test & reflect

On day four, reflection is done on the concept. There are a few things that can be said about this concept:

- The concept contains a Product Service System (PSS). Citizens can subscribe to receive the product and return it if they do not need it anymore. In this way, the plastic can be recycled over and over again. PSS contributes to a more circular economy as it contains a closed loop.
- Also with the subscription model, people get the chance to experience the product made of recycled plastic themselves. This maybe will take away the quality and functionality risk consumers perceive.
- With the participation of the citizens, some control is given to decide how the products will look. This maybe will help to prevent the non-desired "recycled" look. Also, some competition element is added by giving the citizens the opportunity to send in their own ideas and vote for the best ideas. This can help raise more awareness for the environmental problems and products made of recycled plastic in a fun way.
- The concept brings the plastic pollution problem closer to the citizens; it makes the psychological distance smaller. Also, it makes it less abstract what happens with the collected plastic, giving the citizens a more apparent purpose. Collective responsibility is created.
- In order to create more familiarity, it would be better to include ideas to be executed in more public areas. In this way, the unknowing and ignorant citizens are also confronted with products made of recycled plastic and experience the benefits.

- It would be interesting to add different categories for which people can send in ideas. In this way, it can be shown that there are more possibilities with recycled plastic than the well-known water bottles. The citizens are challenged to think within these categories.

## 2.6. Conclusion & takeaways

The pressure cooker provided a kick start for this graduation product. Within four days, a complete design process was conducted. A short literature study and a user study was conducted, which served as input for the ideation. By combining ideas, a concept was formulated and reflected upon.

The pressure cooker provided interesting insights to consider in the project. Firstly, the subscription model is a circular approach, contributing to a circular economy. Also, it provides consumers with an opportunity to try out the products, which may take away perceived quality risk. This needs to be investigated further. Besides, providing citizens with insight into what happens with local plastic could make the problem of plastic pollution less abstract. This also is interesting to investigate. Furthermore, designing for public spaces and places is a good criterion to keep in mind, to get unknowing people in touch with products made of recycled plastic. The last insight to further investigate is the looks of products made of recycled plastic as respondents on the Instagram polls dislike the “eco-look” or “recycled-stamp”.



### 3. LITERATURE REVIEW

The second part of the research chapter is the literature review. The focus of this literature review was to get a better understanding of the influencing (external) factors on the consumers' acceptance of products made of recycled plastic (Figure 7). This section aimed to get insight into the current consumer evaluation of products made of recycled plastic, the perceived risks and benefits consumers have towards products made of recycled, and possible drivers to influence the decision-making process of consumers to purchase the more sustainable recycled plastic version of a product. The theoretical Engel-Kollat-Blackwell model (Engel, Kollat, Blackwell, 1968) is used to investigate the consumer decision-making process.

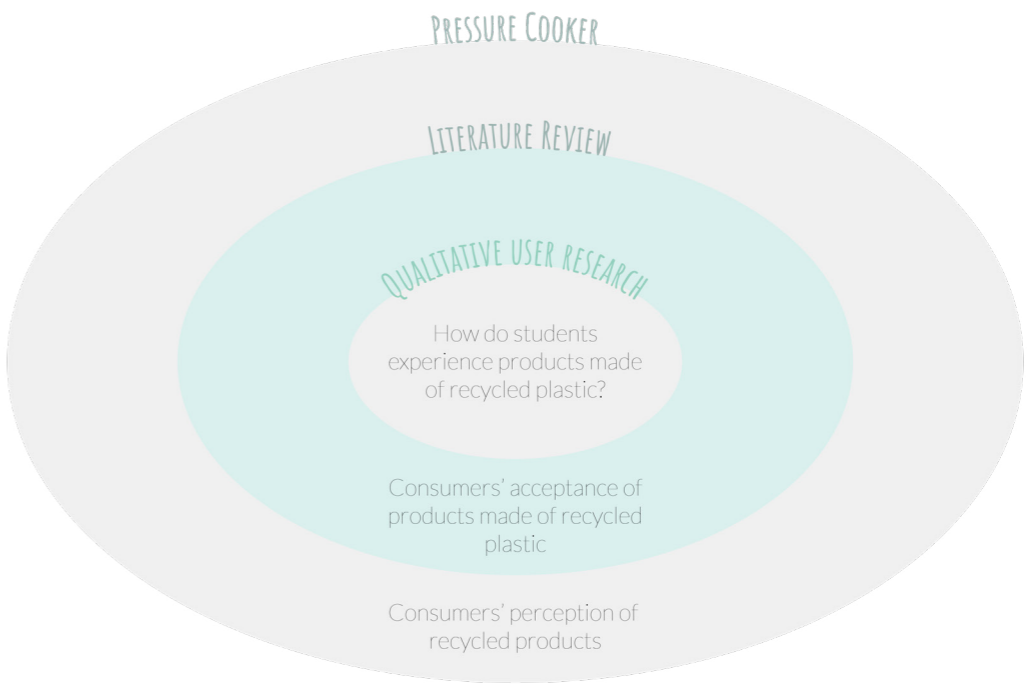


Figure 7: The focus of the literature review

3.1. The plastic route

The introduction section discussed that a large part of the produced plastic ends up as waste in nature. However, what happens with the plastic that is collected? The route plastic takes is presented in Figure 8. Almost 20% of the collected plastic waste is directly incinerated as the material is not seen as high-end enough for recycling. This is a shame as the material still contains 70%

plastic which could be used for recycling (Plastic Fantastic, 2019). Besides, a large part of the European plastic waste was shipped to China for further processing. Since the import ban of China on global plastic waste on the first of January 2018, more plastic waste is incinerated as Europe lacks the capacity to recycle the plastic waste themselves (Brooks, Wang & Jambeck, 2018; NOS, 2018).

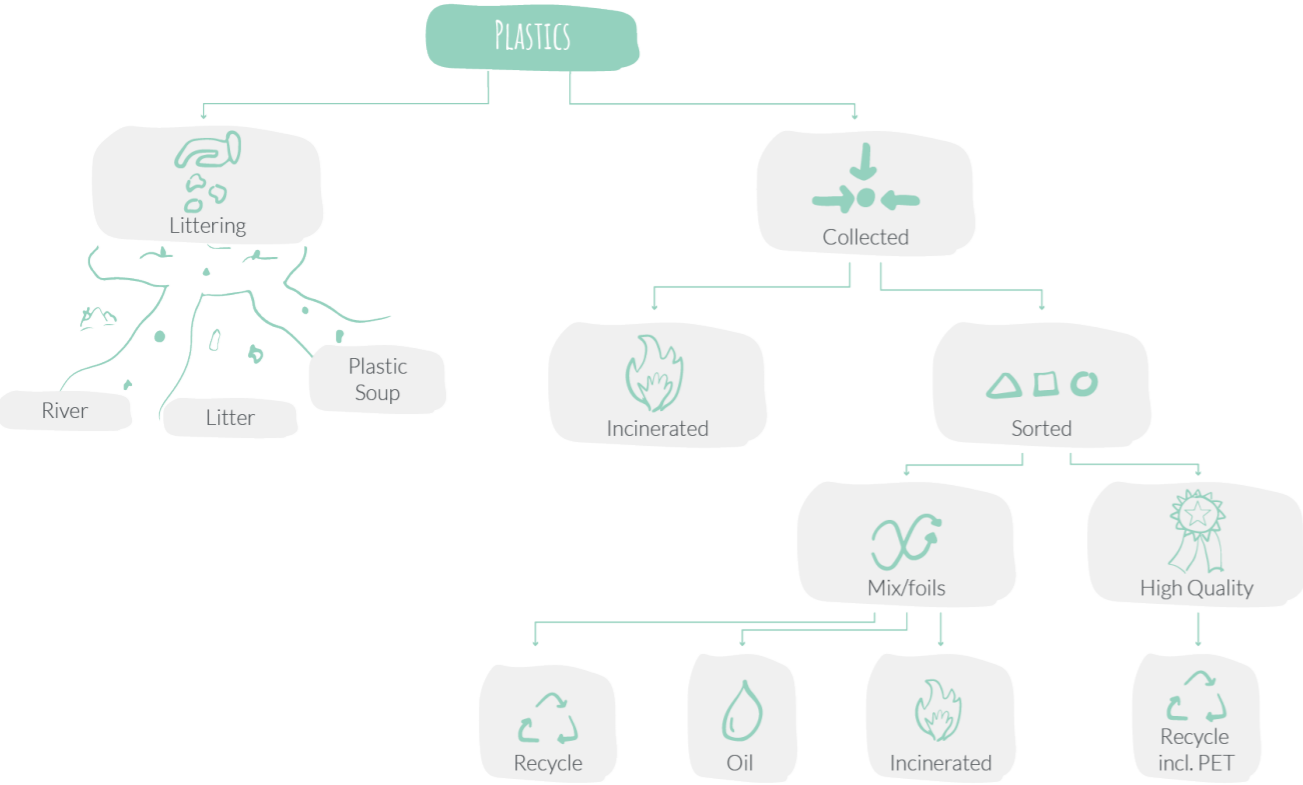


Figure 8: The route of plastic (adapted from Plastic Fantastic (2019))

The plastic waste that is not incinerated is sorted, resulting in a division of high-quality and low-quality plastic waste (mix and foils). The high-quality plastics materials are more than 90% pure, which makes them relatively easy to recycle. Therefore, when sorted, they have a market value (Plastic Fantastic, 2019). The high-quality plastics that are more than 90% pure are PET, HDPE and PP, as shown in Figure 9.



Figure 9: The high-quality plastics

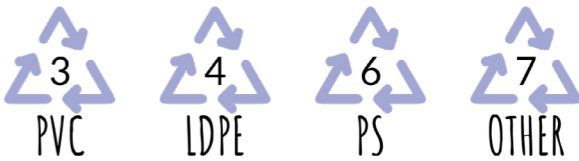


Figure 10: The low-quality plastics

Besides the high-quality plastics, there are also low-quality plastics that require more specialism and costs to recycle (Figure 10). Therefore they have a low market value and are not seen as a valuable resource by companies and manufacturers (Ross, n.d.). The most important categories are the foils (e.g. plastic wrap and plastic bags) and the mix. The mix consists of all the remaining plastics that do not fall in the categories PET, PE, PP, or foils. This makes recycling hard, although it is 90% pure (Plastic Fantastic, 2019).

However, it is not impossible. Fortunately, technological developments make it possible also to use the mix and foils for manufacturing. The recycled mix plastics last for 50 years and can be recycled up to seven times, making it a valuable and qualitatively good resource for products (Save Plastics, 2019). Also, the remaining plastic has almost no market value, so whoever can recycle it has access to a very cheap primary material. Therefore, the low-quality plastic image needs to change from waste to a valuable resource.

Some companies already see the value of the low-quality plastics and produce consumer products with the foils and the mix plastic. Save Plastics, for example, uses

the plastics for the production of jetties, bridges and even an entire house made of mix plastics (see Figure 11). Another example is the company EcoBlocks & Tiles in Kenia. They make new roof tiles from local waste plastic for houses in Kenia (see Figure 12). The last example is the cooperation Plastic Fantastic. They regularly make products from locally collected waste plastic on location, such as merchandise keychains for the Dutch festival Pinkpop made of the old drinking cups (see Figure 13).



Figure 11: The Save Home made of mix plastics (Save Plastics, 2021a)



Figure 12: Roof tiles made of local waste plastic in Kenia (EcoBlocks & Tiles, 2019)



Figure 13: Keychain made of old drinking cups of the festival Pinkpop (Plastic Fantastic, 2018)

### 3.2. Circular economy

In the previous sections, the importance of recycling plastics is stressed. Recycling is a component of the “circular economy”, which can be seen as one solution towards a more sustainable way of consuming. It is based on enhancing a continuous flow of goods and services by designing out pollution and waste, preserving the used materials and products (The Ellen MacArthur Foundation, 2017). Figure 14 illustrates this flow. This circular approach is in contrast to a more traditional linear economic model. The circular economy is a way to achieve a more sustainable business model. It is an

intentionally designed system to create a closed-loop in order to reduce waste and resources. The following elements are essential when designing for circularity: Closed cycles, renewable energy and system thinking. It is important to examine the role of the consumer in this circular model, as this concept is often researched from a production perspective (Calvo-Porral & Lévy-Mangin, 2020; Niinimäki & Hassi, 2011). Therefore it is good to understand the needs and wishes of consumers to design appropriate strategies to attract them to the more circular recycled plastic products.

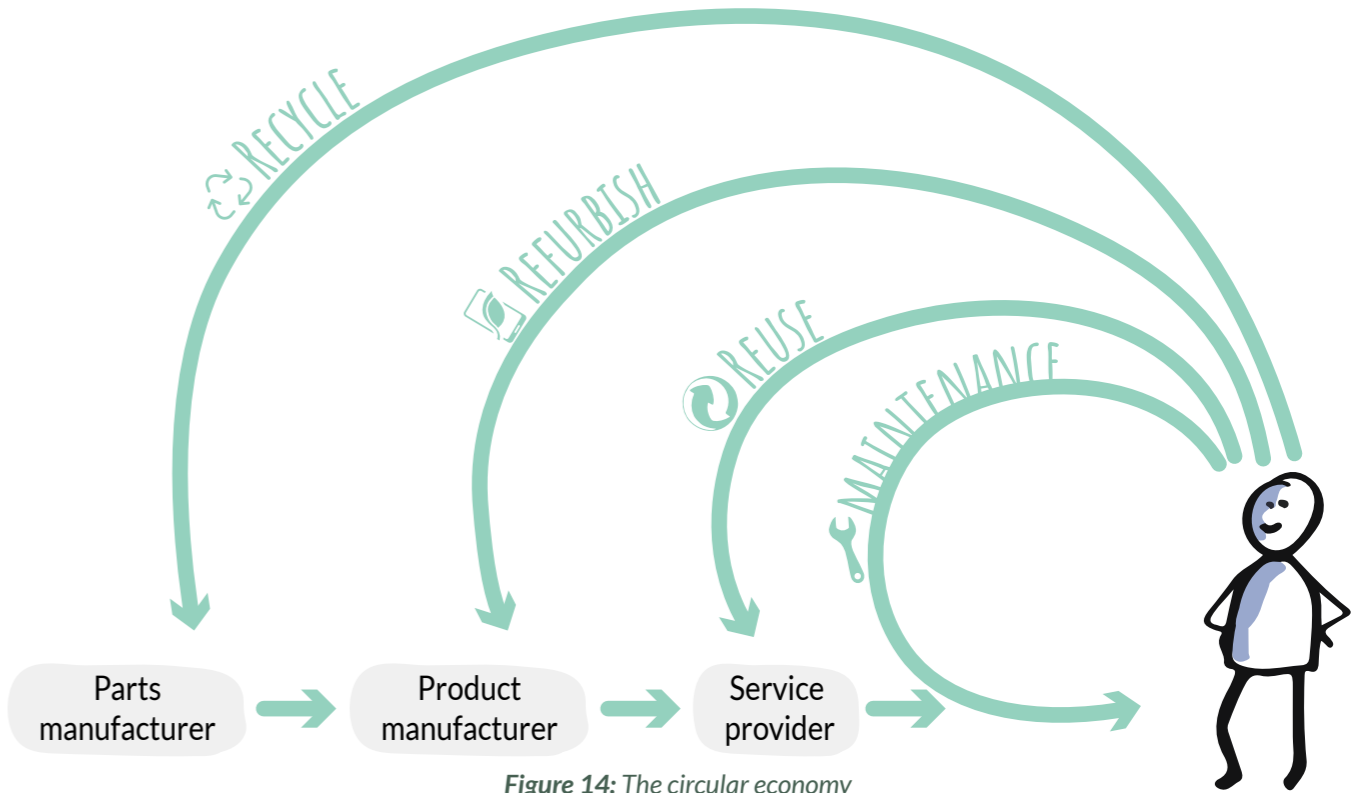


Figure 14: The circular economy

3.3. The decision-making process of consumers

In order to understand how consumers purchase products, it is necessary to look at the decision-making process of consumers. The Engel-Kollat-Blackwell model (Engel et al., 1968) is a widely used theory to describe the psychological decision-making process of consumers. This model divides the decision-making process into five stages occurring over a period of time: need recognition, search for information, evaluation of alternatives, purchase and post-purchase. These five stages of the EKB model are taken, and adjustments are made for a better understanding in the context of this project. This adapted version can be found in Figure 15.

The first stage, need recognition, starts when the consumer recognises a need or problem. This need can be triggered by an advertisement or by friends and gives some initial information about the product they need. With this initial consideration set, the consumer will enter the second stage.

In the second stage, the consumer will start to search for additional information on products that can suffice the need. This search for information can be an internal search through past experiences or an external search (e.g. media, word of mouth) as well when the problem is less simple (UKEssays, 2018). This search for information will lead to a final consideration set of products that possibly fulfil the recognized need. During this stage, it could be that barriers occur. These barriers can prevent the product made of recycled plastic to enter this final consideration set. Therefore, it is interesting to investigate

these barriers to see if they can be taken away.

With this final consideration set, the third stage is entered: the evaluation of alternatives. In this stage, the consumer evaluates any alternative options based on a consumers' personal criteria, beliefs and preferences (Osei & Abenyin, 2016; Jisana, 2014). In this stage, the perceived risks and benefits for each alternative are considered resulting in the purchase decision. It is also interesting to research the perceived risks and benefits consumers experience with products made of recycled plastic. With insight into this, strategies can be designed to enhance a positive evaluation of the products made of recycled plastic and take them to the purchase decision.

When the decision is made, the consumer enters the fourth stage: the purchase of the selected product. In this stage, an in-store decision may be influenced by a salesman or the design of the product display (UKEssays, 2018).

The final stage is the post-purchase stage in which is evaluated if the need or problem is fulfilled. This is also the stage in which the consumer may return a product to the store because it did not fulfil the need.

For the actual purchase of a product made of recycled plastic, this product has to make it through all the stages of the decision-making process. The most crucial stages to research for this project are:

The search for information stage: while the consumer is orienting on products, they can encounter barriers that prevent products made of recycled plastic to enter the final

consideration set.

The evaluation of alternatives: when a product made of recycled plastic makes it to the final consideration set, the evaluation of the perceived risks/benefits can prevent the actual purchase decision of the product made of recycled plastic.

Therefore, the following sections of the literature review investigate the perceived benefits/risks and the barriers consumers experience with products made of recycled plastic. Also, strategies are explored to lower the barriers/perceived risks and increase the perceived benefits to stimulate a favourable purchase decision of products made of recycled plastic.

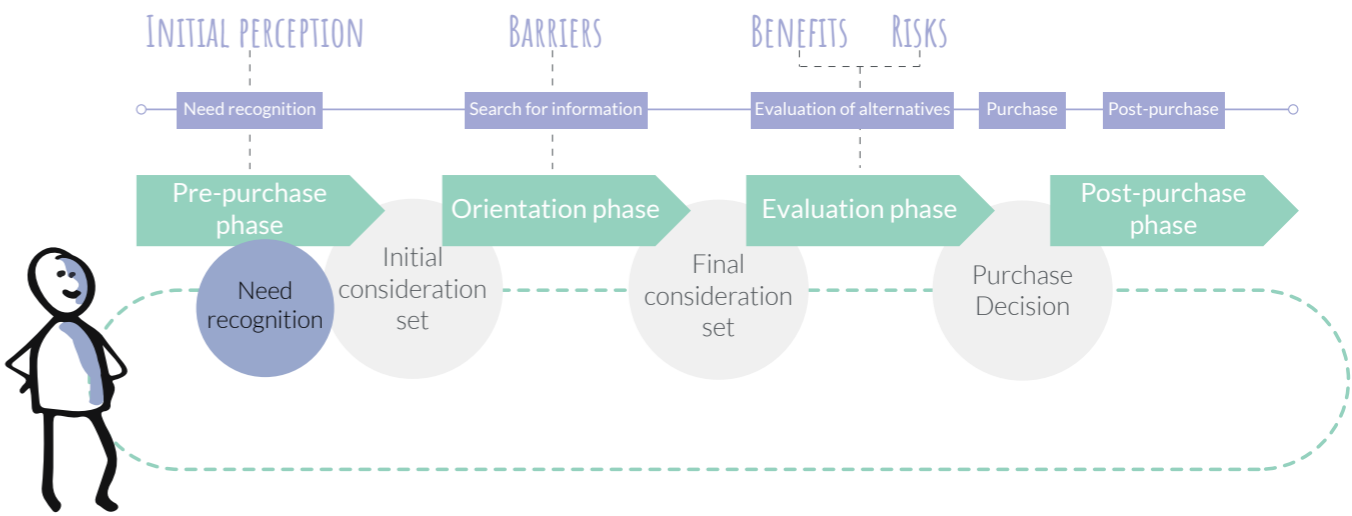


Figure 15: Adjusted version of the Engel-Kollat-Blackwell (EKB) decision-making model

### 3.4. The evaluation of products made of recycled plastic

In existing academic research, the perception of products made of recycled plastic is investigated as well as the perception of “green products.” In general, consumers’ evaluations of products made of recycled ocean plastics are positive (Magnier et al., 2019). This resonates with people’s responses on the Instagram polls of the pressure cooker, in which they indicated that they want to contribute to limiting environmental impact and that they perceive recycled products as environmentally friendly. Green products have a positive image among consumers as they are environmentally friendly (Calvo-Porral & Lévy-Mangin, 2020; Bei & Simpson, 1995), and consumers show a willingness to purchase them if they believe they have the same qualities and functions as products made of virgin materials (Magnier et al., 2019). This is interesting as consumers also perceive risks in greener products and often perceive recycled goods as inferior to new goods (Hamzaoui-Essoussi, & Linton, 2014). Environmentally greener products are automatically perceived as lower quality regardless of the price (Newman et al., 2014). Therefore promoting sustainability in a product will not always enhance the consumers’ purchase decision for the sustainable option. It could even result in sustainability liability. This happens when promoting the sustainability of a product backfires and has a negative effect on the purchase of the products (Trudel, 2018). According to the study of Luchs, Naylor, Irwin & Raghunathan (2010) that researched how to abate sustainability liability in car tires with strength

information, “the sustainability liability is indeed due to consumers’ perceptions that sustainable products are not as strong as less sustainable products”( Luchs et al., 2010, p.27).

Recycled products have the attribute to be environmentally friendly or sustainable (Bei & Simpson, 1995). Therefore, promoting the matter that a product is made of recycled plastic may be a liability and have a negative effect on the consumers’ strength perception of the product. Furthermore, potential perceived benefits and risks of products made of recycled plastic can be identified by looking at existing literature.

#### 3.4.1. Risks

**The perceived safety** is a factor that influences the perceived value of a product made of recycled plastic. According to Calvo-Porral & Lévy-Mangin (2020), safety is one of “the main drivers of consumers’ purchase intention of recycled circular products.” The safety concerns consumers have are caused by the lack of knowledge “regarding product safeguards taken by manufacturers” (Luu & Baker, 2021, p.3). The safety of a product made of reused/ recycled materials needs to be promoted by stakeholders, such as the government, to assure the proper perception of products made of recycled plastic (Sun et al., 2018), and manufacturers should be transparent about their production process (Luu & Baker, 2021).

**The perceived contamination**, related to a product’s safety, is another risk that influences consumers’ purchase intention and can hamper the circulation of recycled materials (Baxter, Aurisicchio, & Childs, 2017). Products made from waste or

used materials, such as recycled plastic, are perceived as contaminated by some consumers (Calvo-Porral & Lévy-Mangin, 2020). Accentuating that a product is made of recycled plastic (bottles) can activate this contamination belief or even feelings of disgust among consumers as it signals that the material was in contact with another person (Meng & Leary, 2019; Magnier et al., 2019). The studies of Meng and Leary (2021) and Baxter et al. (2017) show that these feelings of disgust and contamination are stronger for more personal/intimate products made of recycled plastic bottles (e.g. T-shirts). This can be explained by the fact that people have the natural desire to protect themselves from all the things that might harm them through touch on the skin and these products are in close contact with the skin (Meng & Leary 2019). Therefore to stimulate a higher purchase intention, it is wise to use recycled plastic for the less intimate products to keep the contamination beliefs as low as possible.

**The perceived quality** is another factor that influences the purchase decision of products made of recycled plastic. The presence of recycled materials in a product can decrease the quality expectations consumers have in the product compared to products made of virgin materials (Calvo-Porral & Lévy-Mangin, 2020; Newman et al., 2014). In the study of Wang, Hazen & Mollenkopf (2018), who researched consumers perceptions of remanufactured automobile parts compared to new parts, this uncertainty of the consumer about the quality of the remanufactured parts is explained by the lack of experience with remanufactured automobile parts and the unawareness of how these parts are used in the past. It is assumed that this lack of

experience with using recycled plastic in products and the unawareness of previous use of the plastics is causing concerns about the quality of a product made of recycled plastic. However, in some cases, recycled plastic is actually inferior to virgin plastic as the recycling process can reduce its quality (Hamzaoui-Essoussi & Linton, 2014). This makes it even more confusing for consumers. Besides, consumers assume that when a company intends to produce a product with environmental benefits, the company invests less in quality. This perception of a reduced quality results in a lower purchase intention (Newman et al., 2014). Consumers showed to be more likely to purchase the product when the same green benefit was communicated as an unintended side effect by the company (Newman et al., 2014). Communicating the environmental benefits of products made of recycled plastic as an unintended side effect to enhance the quality perceptions will be a challenge since consumers recognize them to have environmentally friendly attributes (Bei & Simpson, 1995), which was discussed before.

**The perception of financial risk** (failure to provide value) is another factor that can have an influence on a consumers evaluation phase of a recycled product (Grewal, Gotlieb, & Marmorstein, 1994; Sun et al., 2018). Magnier et al. (2019) show that when consumers have a lower (higher) perception of the quality of a product made of recycled ocean plastic, their value for money is also lower (higher), which decreases their purchase intention. Also, consumers perceive a higher functional risk when a product contains recycled materials, resulting in a lower willingness to pay a price premium for the product (Hamzaoui

Essoussi, & Linton, 2010). Another study by Bray et al. (2011) showed that participants experienced dissonance after purchasing an ethical product because of a higher price. In some cases, this resulted in avoidance of (ethical) products in the future as they have the perception that ethical goods have a higher price without any tangible benefits. Interestingly, the same study showed that price was less of a problem for locally produced products. Somehow the consumers seemed to justify the bit of extra money (Bray et al., 2011).

**The cynicism of consumers** can be identified as another factor that can negatively influence the evaluation of products made of recycled plastic. Consumers are sceptic about the use of ethical symbols and ethical claims by companies (Bray, Johns & Kilburn, 2011). Claiming ethical practice for competitive advantage is perceived as an advertising trend of big companies (Bray, Johns & Kilburn, 2011). Therefore, marketing green efforts by companies are sometimes judged as “greenwashing” (Bickart & Ruth, 2012). Greenwashing can be defined as “advertising that makes partial or unsupported ecological claims with the expectation that consumers will be unable to critically assess these claims” (Luu & Baker, 2021, p.3). This same cynicism came forward in the pressure cooker, in which respondents indicated that the “recycled stamp” quickly felt like a marketing tool. However, the study of Matthes & Wonneberger (2014) revisited the notion that consumers are sceptical about green advertisements and that this scepticism especially holds for the more environmental concerned consumers. The study stressed that most other

studies did not take consumers general scepticism towards advertisements into account. Therefore it is important to separate sceptical beliefs towards green advertisements from sceptical beliefs towards general advertisements. Also contradictory to other studies, the study of Metthes & Wonneberger (2014) showed that especially the more environmental concerned consumers have more trust in green advertising, as it is perceived as highly informative. It helps them to make better purchase decisions and provides information about the product attributes. This resonates with the research of Bray et al. (2011), who declared that the cynicism of consumers seemed to have a relation to the lack of information about the benefits of green practices of companies, in combination with an information overload about unethical practices, leading to confusion. Therefore, it is relevant to follow the study findings of Metthes & Wonneberger (2014) for a positive evaluation of argument quality in green advertising when advertising products made of recycled plastic to avoid the cynicism of consumers. When promoting products made of recycled plastic, the mentioned arguments should be “strong, trustworthy, and high in informational utility” (Metthes & Wonneberger, 2014, p.125) to meet consumers need for information.

### 3.4.2. Benefits

So far, the previous subsection has focussed on consumers perceived risks with products made of recycled plastic, but there are also benefits that can be identified. This section will discuss these perceived benefits.

Products made of recycled plastic bring **environmental benefits**. There is an increasing demand for greener products as consumers become more conscious of environmental problems (Hamzaoui Essoussi, & Linton, 2014). The circularity of a product positively affects consumers’ perceived environmental benefits (Magnier et al., 2019). By purchasing products made of recycled plastic, they actually limit their impact on the environment (Bucknall, 2020). For example, when purchasing textiles made of recycled plastic, the plastic bottles used for the garment get a second life and do not end up in the landfill. Besides, 90% less water is needed to produce the new garment (Luu & Baker, 2021)! Deriving from the environmental benefit, consumers **perceive psychological benefits** when buying products made of recycled plastic. Recycled products have the attribute that it is perceived as environmentally friendly (Bei & Simpson, 1995; Hamzaoui Essoussi, & Linton, 2014; Calvo-Porral & Lévy-Mangin, 2020). Purchasing products made of recycled plastic arouses a psychological feeling of contributing to the environment. These positive psychological feelings hold especially for the more environmentally conscious consumers (Bei & Simpson, 1995), as they notice purchasing green products being good for themselves and for the society (Gutierrez, Chiu & Seva, 2020).

Closely related to the psychological benefit

deriving from the environmental benefit is **anticipated conscience**. Anticipated conscience is an affective benefit, and it can be defined as “consumer’s expectations regarding how the product will make him/her feel in an ethical sense.” (Magnier et al., 2019). Consumers do not want products that are only functional anymore; they have to be pleasurable as well (Gutierrez et al., 2020). A purchase of a product is motivated by the “expected positive consequences for the self and others” (Gutierrez et al., 2020, p.5). When a product (made of recycled plastic) triggers positive emotions within a consumer, a positive purchase decision is more likely to occur. Where the psychological benefits occur during/after the purchase of products made of recycled plastic, anticipated conscience arises before the purchase of the ethical product.

Also, consumers can perceive **social benefits**, as environmental friendliness can enhance a consumers reputation (Wang, Wiegerinck, Krikke, & Zhang, 2013; Wang et al., 2018). Environmental friendly consumption can function as a positive social indicator (Magnier et al., 2019). As discussed before, products made of recycled plastic have the attribute of being environmentally friendly; hence, through purchasing products made of recycled plastic, consumers can express social responsibility (Calvo-Porral & Lévy-Mangin, 2020) may contribute to a consumers’ social status. However, the social status of a consumer can also negatively influence the purchase decision of products made of recycled plastic. As consumers tend to protect their positive social identity, they are likely to avoid people and messages that threaten this social identity (Johnstone & Tan, 2014). When a consumer does not

feel connected to green consumption or has social connections that will not “accept” green consumption, this may lead to resistance to green consumption and products made of recycled plastic.

### 3.4.3. Barriers

Some possible barriers can be identified that limit the products made of recycled plastic to enter the final consideration set. These barriers also partly cause why consumers perceive the risks and prevent consumers from seeing the benefits with products made of recycled plastic mentioned above:

There is a **lack of familiarity** with using recycled plastic in products. Not all recycled material has been promoted and offered on the market for a long time, for example, compared with recycled paper (Hamzaoui Essoussi, & Linton, 2010). The lack of experience with products made of recycled plastic makes consumers less able to assess the safety or quality of a product. (Calvo-Porrall & Lévy-Mangin, 2020) Also, unfamiliarity with a brand decreases the perception of product quality the brand can deliver (Van Weelden, Mugge, & Bakker, 2016). However, connecting green attributes of a product to a familiar brand in advertisement can decrease consumers’ concerns with products made of recycled plastic.

Another barrier related to the lack of familiarity is the **lack of knowledge**. Firstly, consumers lack knowledge about the extent of the environmental problems. This leads to ignorance by consumers of what kind of actions they can take, how they can take actions of which they are

conscious and what the benefits are of different actions (Gifford, 2011). Secondly, there is a lack of knowledge about using recycled plastic in products. Consumers lack the knowledge of the effects on functionality and performance of using recycled plastic in products, making them assess the products differently than when made of virgin materials (Essoussi, & Linton, 2010). They lack information and need to be fully informed to make an effective purchase decision (Bray, 2010). Also, this lack of knowledge makes consumers doubt the quality of products that consist of recycled material (Sun, Teh, & Linton, 2018). Besides, knowledge about the environmental impact of plastic seems to play a role as well. Consumers with higher education and environmental knowledge show awareness of the environmental impact of plastic and are more plastic avoidance than less educated people (Heidbreder, Bablok, Drews & Menzel, 2019). For a better appreciation of recycled plastics, addressing this lack of knowledge is required by educating everyone in society on how they can limit the impact on the environment individually and collectively (Bucknall, 2020). However, it should not be assumed that educating consumers about the environmental problems will lead directly to more sustainable behaviour. Providing consumers only with information to educate them is insufficient. It will not automatically change consumers’ behaviour (Verplanken, 2018) as consumers still lack the knowledge on how to act responsibly upon the environmental issues (Johnstone & Tan, 2015). Therefore, other strategies are also needed to stimulate the purchase of products made of recycled plastic among consumers.

The last barrier is the **cognitive capacity** of consumers. Gifford (2011) explains that the human brain did not evolve much over the last thousands of years. The primary focus of our ancestors was on immediate dangers and finding resources, all in the present time and direct effect. Purchasing products made of recycled plastic for the sake of limiting the impact on the environment is a very distant thing to do with no immediate present effect. The environmental problems and sustainable behaviour are outside the attention zone of consumers as it is not causing them any immediate harm (Gifford, 2011). More abstract thinking from consumers is needed when an event or object is more distant, making it hard for consumers to grasp the negative impact of consuming non-green products (Johnstone & Tan, 2014). This makes it also difficult for consumers to understand the future (environmental) benefits of products made of recycled plastic. However, our ancient brain does have the capacity of managing abstract things such as environmental problems, but this isn’t easy.

## 3.5. Strategies for sustainable consumer behaviour

As discussed before, this project aims to stimulate the sustainable behaviour of purchasing products made of recycled plastic and enhance consumer acceptance of products made of recycled plastic. Sustainable consumer behaviour can be defined as “behaviour that attempts to satisfy present needs while simultaneously benefiting or limiting environmental impact” (Trudel, 2019, p.85). Purchasing products made of recycled plastic can be seen as sustainable consumer behaviour as it limits the environmental impact and satisfies the recognised present need of a consumer. In existing research, strategies to encourage sustainable consumer behaviour can be found. This section explores different strategies that may reduce the perceived risks, reinforce the perceived benefits and lower the barriers consumers experience with products made of recycled plastic. Therefore, these strategies can enhance that the products made of recycled plastic go through all the five stages of the EKB model, resulting in the actual purchase of the product made of recycled plastic. Four possible strategies are discussed in this section.

### Nudges

Using **nudges** can motivate consumers to perform a particular behaviour. Nudges are subtle suggestions, positive reinforcements to stimulate the desired behaviour of consumers (Trudel, 2018). By providing reinforcement, the sustainable behaviour is linked to a positive consequence, which increases the probability of the sustainable behaviour (Kok et al., 2016b). Nudging can be used to subtly and gently persuade the

consumers towards the green decisions. It includes choice architecture, changing the default option and harnessing social influence (Trudel, 2018; Schubert, 2017). Choice architecture is the way the choice is framed/presented to the consumer, for example, by presenting the choice for the product made of recycled plastic more outstanding or remarkable way. The default option requires “consumers to actively opt-out of something if they do not want it” (Trudel, 2018, p.87). It utilizes the passive choice, as consumers tend to take the easiest option.

Nudges can also convey the social norm about choices and harness the social desire of consumers to fit in (Schubert, 2017). In the opinion of Verplanken (2018) it is naïve to assume that nudges only will lead to more sustainable consumer behaviour. He stresses that large scale “nudges” are needed, such as legislations and regulations. These upstream measures force consumers into a choice or behaviour. Partly, I agree with Verplanken (2018) as immediate action has to be taken to tackle the environmental problems since we do not have decades to ease into change. However, I think one also needs to be careful with forcing consumers with legislation. Gifford (2011) states that “many people distrust messages that come from scientists or government officials”. They have the feeling that the policy or advice is threatening their freedom, and some people heavily react against it. Partly this is caused by the lack of trust in the ones providing the message (Gifford, 2011). This resonates with Trudel (2018) as he explains that communicating a sustainable behaviour as something a consumer must do can backfire, resulting in resistance to the issue. When consumers considered

the environmental problem to be less important, “suggestive messages were more effective than assertive messages.” (Trudel, 2018, p.92).

### **Tangible future**

As discussed in the barriers, it is hard for a human brain to grasp the benefits of purchasing products made of recycled plastic as they seem to be very distant and abstract. It is hard for consumers to evaluate the effect of their actions (Verplanken, 2018) that do not have immediate benefits and can be costly in the short term (Weber, 2017). Consumers prefer consequences and benefits that are closer to the present when evaluating the alternatives to make a purchase decision. Therefore it is needed to make the benefits of the sustainable behaviour more **tangible and less abstract** (Trudel, 2018). According to Verplanken (2018, p198.), “**goal setting and committing** to sustainable targets are successful strategies to instigate future sustainable behaviours.” This is supported by Kok et al. (2016a). By committing to a sustainable behaviour in advance, consumers are more likely to act upon this commitment, for example, signing up to run a marathon. Hotel guests were more likely to reuse their towels when they committed to do this upfront during the check-in (Trudel, 2018). Verplanken (2018) also mentioned **feedback and rewards** as strategies to motivate sustainable consumer behaviour. The disadvantage of rewards is that it works as extrinsic motivation. When the rewards are removed, mostly also the effect on the behaviour disappears (Verplanken, 2018). With intrinsic motivation, the engagement for a task, activity or (sustainable) behaviour is driven by a person’s own

interest or enjoyment for the behaviour or own personal achievements (Deci & Ryan, 2000). A personally meaningful goal can stimulate intrinsic motivation in people to perform a specific behaviour and learn a new skill, for example (Malone, 1981).

Another way to make the future more tangible is by providing consumers with information about the **lifetime costs** of products made of recycled plastic. As the recycled mix plastic last for 50 years and can be recycled up to seven times (Save Plastics, 2019), emphasising future savings on products could make it easier for consumers to understand the benefits in the short term. The study of the Department of Energy and Climate Change & the Behavioural Insights Team (DECC & BIT, 2014) showed that consumers were more likely to buy the more energy-efficient washing-drying machine when informed about the lifetime running costs of the product at the moment of purchase. Providing the consumers with the monetary lifetime cost of the machine on the label in addition to the energy usage in kWh/year of the product (which was abstract information for consumers) improved the salience of the information presented to the consumer (DECC & BIT, 2014). In this way, future savings are highlighted, making it easier to understand in the short term, neutralizing the maybe higher purchasing costs of the product. Benefits need to be emphasized in the present, and the costs pushed to the future.

A combination of the strategies to make the future less abstract and more tangible is suggested for the best success (Verplanken, 2018).

### **Social influences**

**Communicating social norms** is another strategy for sustainable consumer behaviour (Gifford, 2011; Verplanken, 2018; Trudel, 2018) and could simulate consumers to purchase products made of recycled plastic. It holds a close relation with **self- and social identification**. The behaviour of consumers is heavily influenced by what other people think and what they think others want them to do (Verplanken, 2018). Consumers tend to benefit from signalling information (good environmental behaviour) about themselves to others. Consumers not only value the tangible benefits of a product, but they also value what the product represents to others and to themselves (Trudel, 2018). When there is a possibility of gaining social reputation and status, there is an increase in personal investment protection of the environment (Trudel, 2018). As the study of Oversteet (2021) shows, “42% of Americans want to be seen as someone who buys eco-friendly products”. Green products are often more pricey or of less quality than alternatives, and therefore they are a costly signal as it shows the financial ability and willingness of a consumer to invest in something for society (Trudel, 2018). Hence, consuming products made of recycled plastic can express a consumers’ sustainable behaviour and contribute to the status signalling. However, it has to be **visible to others**. Therefore using recycled plastic products in public can contribute to the image consumers wish to express about themselves to others (Magnier et al., 2019). However, there can also be a negative effect. This happens when consumers start to consume the product more often as an opportunity to signal their good recycling behaviour to others (Trudel, 2018).

Communicating social norms among environmental behaviour is a good potential driver as consumers desire to fit in. When householders were told of the average energy usage of other households in their community, they showed the tendency to change their energy use in order to fit this norm (Gifford, 2011).

### Brand recognition

Another strategy that could reduce the barriers and risks perceived by consumers is a **strong brand**. A brand can be defined as “a name, term, sign, symbol, or design, or a combination of them, that is intended to identify the goods and services of one seller or a group of sellers and to differentiate them from those of competitors” (Kotler, 1997, cited in Hamzaoui-Essoussi & Linton, 2014). Consumers use extrinsic indications to generate an overall value of a product, and brands can act as a positive indicator in consumers’ decision-making process as strong brands are associated with high quality, reducing the perceived risk of a product (Hamzaoui-Essoussi & Linton, 2014). In addition, research in green marketing has shown that the attitude of a consumer towards an advertisement is related to the attitude towards the named brand and the intention of the consumer to purchase the product or service (Jamar, 2020). However, there could also be a risk for a brand in launching products made of recycled plastic. The lower perceived quality of recycled products can have a negative impact on the brand (Hamzaoui-Essoussi & Linton, 2014). Also, the effect of vicarious moral cleansing may occur. This can be described by when a consumer feels allowed to act immorally because of the socially responsible behaviour of the brand they are strongly connected to (Trudel,

2018).

For a small, not so familiar and strong brand, **co-branding** can be a marketing strategy that can enforce the purchase of products made of recycled plastic. With co-branding, two or more brands are collaborating to attract more consumers and strengthen the power and status of what each brand can offer. It is a good way for a brand to show its consumers that they have more to offer (Shoeb, 2016). Two entities are involved in co-branding: the host brand and the invited partner brand (Jamar, 2020). In order to make co-branding a success, the perceived (feature) similarity between the two plays a role. The more congruence of attributes between the host and partner brand, the more likely it is that information, such as knowledge, affections and intentions, is transferred from the well-known to lesser-known. (Jamar, 2020; Martin & Stewart, 2001). Brand familiarity has the ability to transfer from the host brand to the partner brand when there is a good match (Jamar, 2020). It could be a good strategy to co-brand between a brand with products made of recycled plastic as a host, and a well-known, strong brand as a partner, to influence the attitude of consumers towards the host and, therefore, the purchase intentions. Also, co-branding with an already strength related brand can be used as strength cues and counter sustainable liability (Luchs et al., 2010) because the brand familiarity transfer may take away the perceived risk in quality consumers have with sustainable products.

However, a side note has to be made. Most literature studies about strong brands and co-branding concern environmental friendly brands in general and not

necessarily recycled plastic products. So it is needed to be careful with the assumptions made above.

Nevertheless, I think that when a strong familiar brand launches a product made of recycled plastic, consumers perceive fewer risks as they recognize the brand. However, for the smaller brands, it would be beneficial to partner up with a strong brand or one that is associated with green perceptions to strengthen the attitude and recognition.

3.6. Conclusion

The literature review has provided background information on different topics concerning consumers' acceptance of products made of recycled plastic.

First, more insight was given on the route plastic waste takes and what kind of plastic is suitable for recycling. Besides high-quality plastics, there are also low-quality plastics that can be used for recycling. Unfortunately, it is not seen as a valuable resource by businesses, although the recycled mix plastics last for 50 years and can be recycled up to seven times. Therefore it is needed that this bad image is changed.

Also, the circular economy is discussed as a solution towards a more sustainable way of consuming and is based on closed cycles, renewable energy and system thinking. The role of the consumer is crucial in this, so understanding the needs and wishes of consumers is needed to make a circular business model work for products made of recycled plastic.

To obtain a better understanding of how consumers decide to purchase products (made of recycled plastic), the Engel-Kollat-Blackwell model is investigated to describe the decision-making process of consumers. The literature review focussed on orientation and the evaluation phase of the EKB model. This provided an understanding of how consumers perceive products made of recycled plastic and what factors influence their purchase decision. The fact that a product contains recycled plastic can activate perceived risks. Five perceived risks are identified: *Perceived safety, contamination, reduced quality, financial risk and cynicism*. Also, three perceived benefits are described: *Environmental benefits (+ the deriving psychological benefits), anticipated conscience and social benefits*. Currently, the sum of the perceived risks and benefits mostly results in an unfavourable purchase decision of products made of recycled plastic. Furthermore, three barriers are identified that prevent products made of recycled plastic to enter the final consideration set: *Lack of familiarity, lack of knowledge and cognitive capacity of the brain*. These barriers also influence the perceived risks and benefits and cause a negative balance between them, resulting in a negative purchase decision of products made of recycled plastic.

Lastly, existing strategies for sustainable consumer behaviour are discussed as potential strategies to enhance a positive purchase intention for products made of recycled plastic: *Nudges, tangible future, social influences and brand recognition*. These strategies focus on mitigating the perceived barriers and emphasizing the benefits of products made of recycled plastic. Therefore it is important to take the insight from these strategies as design guidelines when designing for consumers' acceptance of products made of recycled plastic.

An overview of the literature review and how this relates to the EKB model was made. This overview also includes the suggested strategies, and this overview is illustrated in Figure 16.

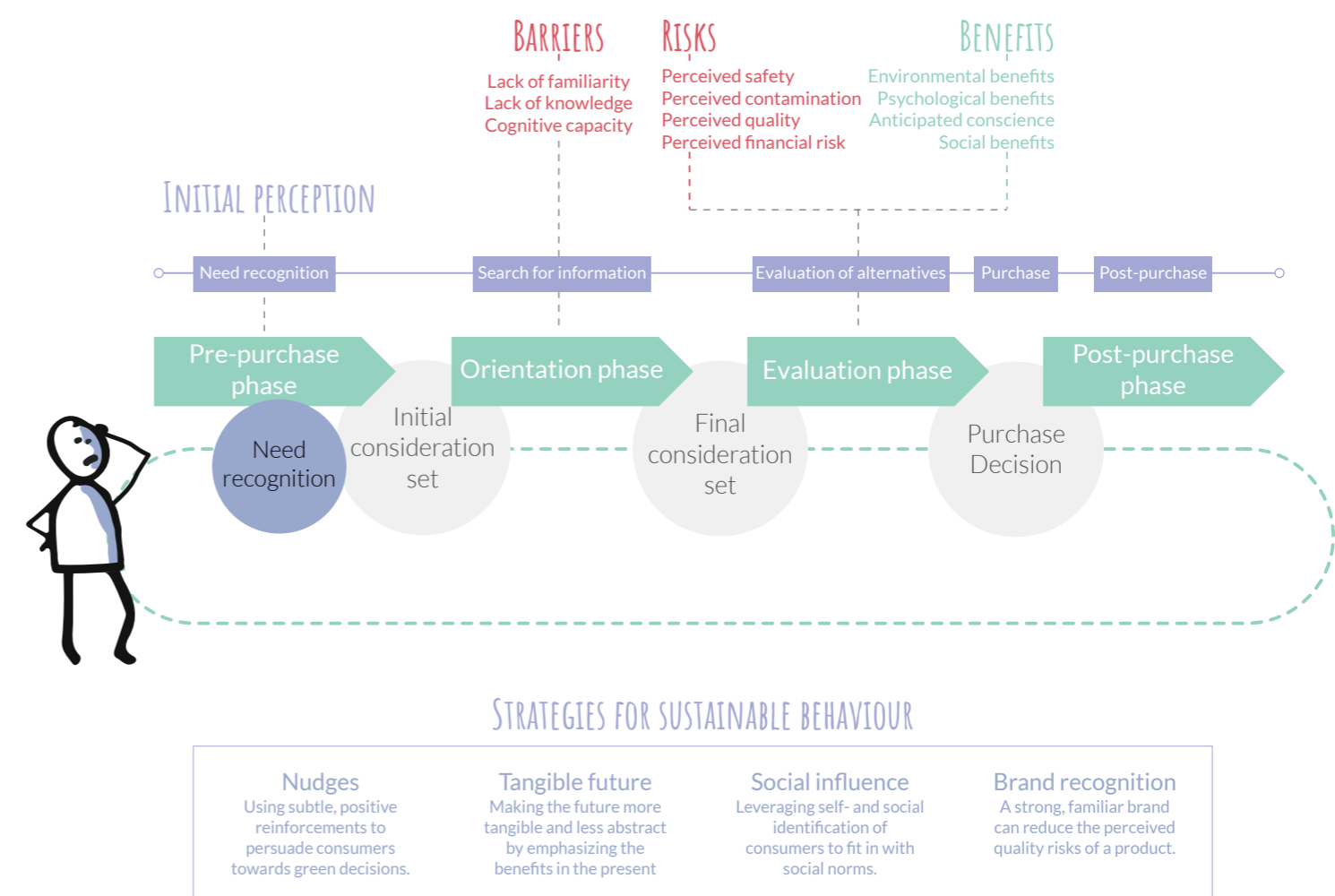


Figure 16: Overview of literature review in relation to the EKB model



#### 4. QUALITATIVE USER RESEARCH

The previous section focussed on gaining insights into how consumers perceive products made of recycled plastic, based on existing literature. Although the studies discussed in the literature review provide a good understanding of the perceived risks, benefits, barriers and strategies, most of the studies lack a deeper understanding of a consumers context and experiences with products made of recycled plastic due to the quantitative nature of the studies. Therefore, a qualitative user research study is conducted to attain additional data and information.

In order to gather qualitative information from consumers, the context mapping method is used. This is a design research approach that makes use of creative techniques to make the implicit more explicit. My approach consists of the following steps: Defining the scope and focus, sensitizing the participants, conducting interviews with a creative exercise, analyzing the results and creating a framework. These steps will be discussed in detail in the following sections. This qualitative user research dives deeper into the project and tries to answer the following research question: *How do students experience products made of recycled plastic?* This layer is depicted in Figure 17.

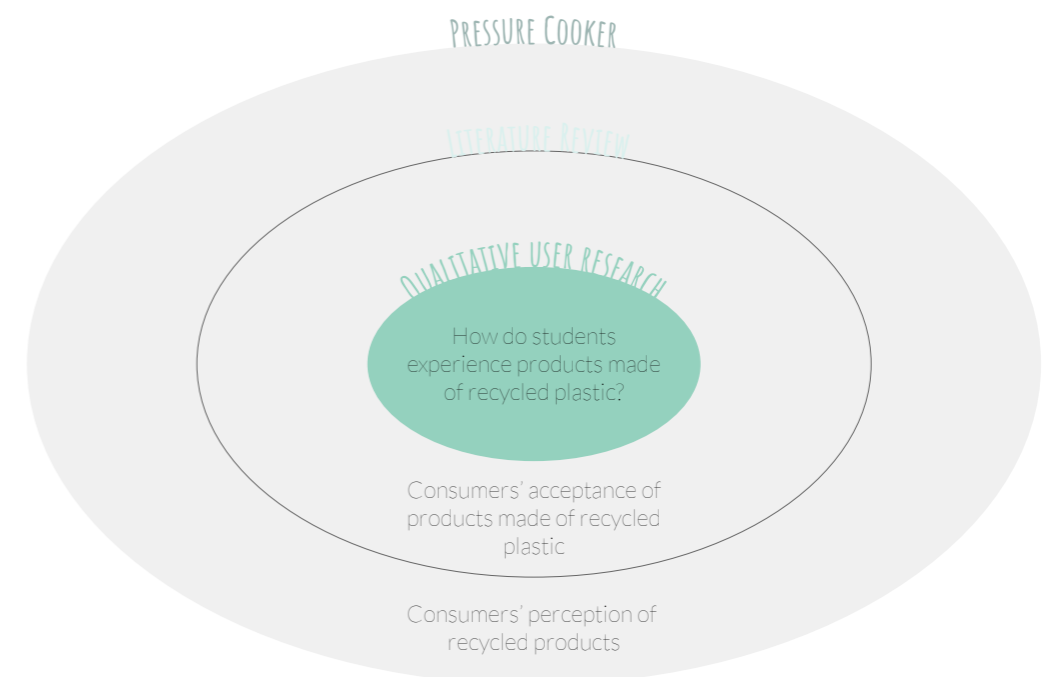


Figure 17: The layer of the qualitative user research

## 4.1. Focus and scope

At this stage of the project, the scope and focus of the project were refined before starting with qualitative user research. Whereas the literature review is on more general consumer acceptance of products made of recycled plastic, the focus of this section will be on students living in the Netherlands and their experiences with products made of recycled plastic. Students are an interesting consumer group to investigate, as the literature review shows that knowledge and education are strong influencing factors on how people perceive products made of recycled plastic (Nguyen et al., 2020). Apart from the fact that students have a high level of education, they belong to the Millennials, or Generation Z. A study has shown that the purchase decision of these consumer groups is more and more based on the sustainability practices of the company and that they prefer to purchase from sustainable brands (First Insight, 2021). These generations not only want to buy more sustainable products, but they are also willing to pay 10% or more for sustainable products. This willingness to pay more seems to increase with every generation (Petro, 2020). Also, due to the Covid-19 pandemic, it is harder to recruit participants. Students are a group I had better access to as I am a student myself.

Therefore, the research question for the qualitative user research is presented as below:

*How do students living in the Netherlands experience products made of recycled plastic?*

This question can be divided into three subgoals for the generative sessions:

- (1.) Provide an understanding of experiences (past, present and future) of students of products made of recycled plastic and
- (2.) understand the context in which these experiences take place in order to
- (3.) identify opportunities to improve the future experience with products made of recycled plastic.

Different assignments and tools were given to help the students explore the surroundings of the scope. This is indicated with the arrows in Figure 18. The assignments were open-ended, so the participants could choose to sort of “drift” into the focus out of their own will to a profound expression of their experiences with products made of recycled plastic. Also, the assignments are based on the layered approach of the path of expression.

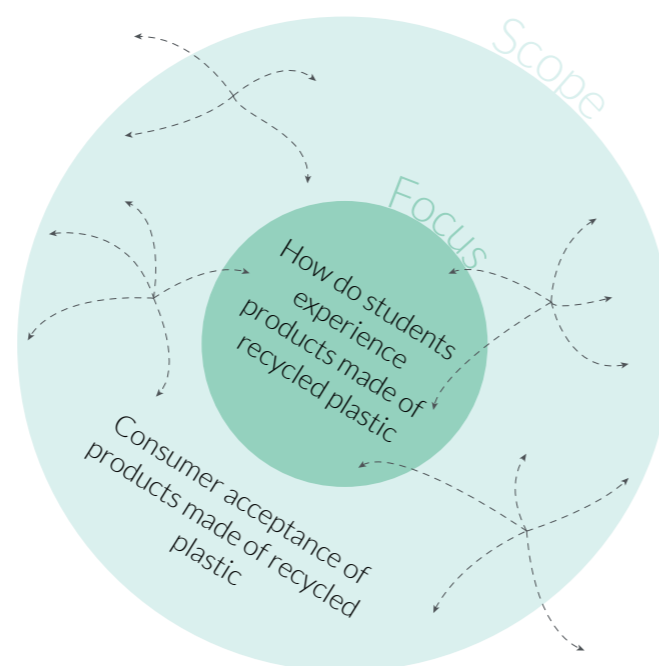


Figure 18: Scope and focus of the generative research

## 4.2. The approach

The Context Mapping design research approach is used to gain a deeper understanding of students experiences with products made of recycled plastic. It makes the students express their dreams and ideas for future experiences by using generative sessions. In contrast to the more traditional methods, like interviews and observation, which only touch the surface of consumers perceptions, the advantage of the Context Mapping method is that by using generative techniques, you are able to reveal a deeper layer of understanding into consumers needs and dreams of new products (*Probes for Context Mapping - How to Design and Use Them*, 2020). Another advantage is that by involving the consumer/students, you emphasize with them. This is very useful as this will help design strategies that actually fit in consumers' lives (Visser, Stappers, Van der Lugt & Sanders, 2005).

The used generative techniques aim to elicit emotional responses from the students

towards products made of recycled plastic to gain insight into *why* consumers perceive the risks and benefits described in the literature review. Also, there is investigated if and how the discussed strategies in the literature review apply to the participants. For this deeper understanding, the structure of the path of expression was used to gain knowledge at different levels.

The path of expression (Figure 19) is a process to guide a participant in linking relevant insights from present and past experiences with products made of recycled plastic to communicate and envision their desired future experiences with the products. First, the student is asked to observe and document his/her current (purchase) activities. Secondly, the student is asked to recall the past and select memories from earlier experiences. After this, the student reflects on these memories and possibilities for the future. Lastly, this future is envisioned using a collage making exercise.

## The path of expression

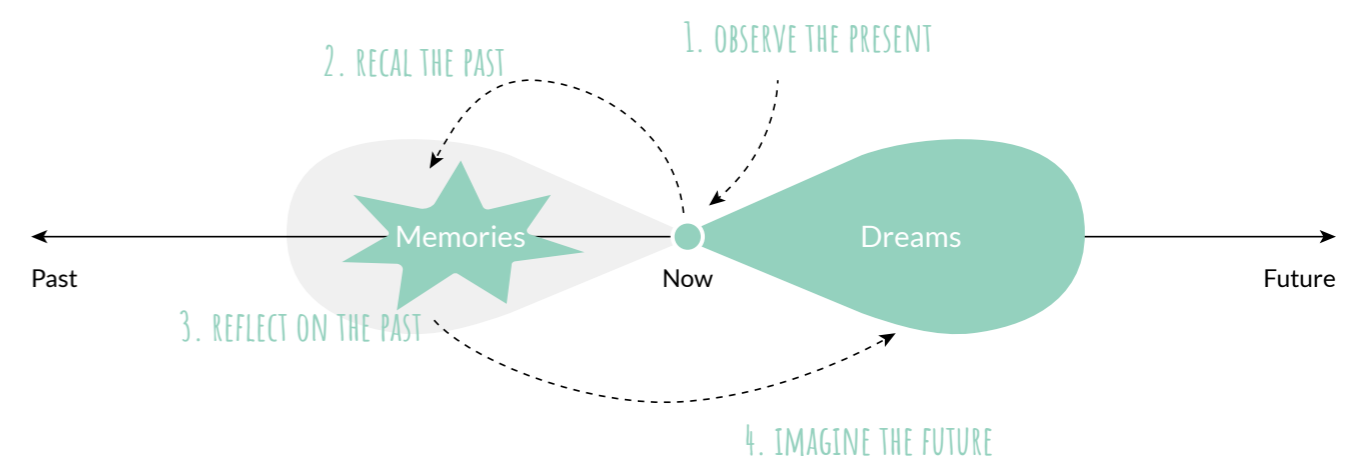


Figure 19: The path of expression

The reasoning behind this layered approach is that it is difficult to ask people questions about their needs, values and future desires straight away, as these are abstract qualities people are often not used to talking about. It is information that belongs to tacit knowledge, the things we know but are hard to communicate to others verbally, and latent knowledge, the ideas and thoughts we have not experienced yet but on which opinions can be formed based on past encounters and experiences with products made of recycled plastic. Figure 20 illustrates these different levels of knowledge and research methods to examine what people make, say and do to reveal those levels (Sanders & Stappers, 2012).

Methods to access different levels of knowlege

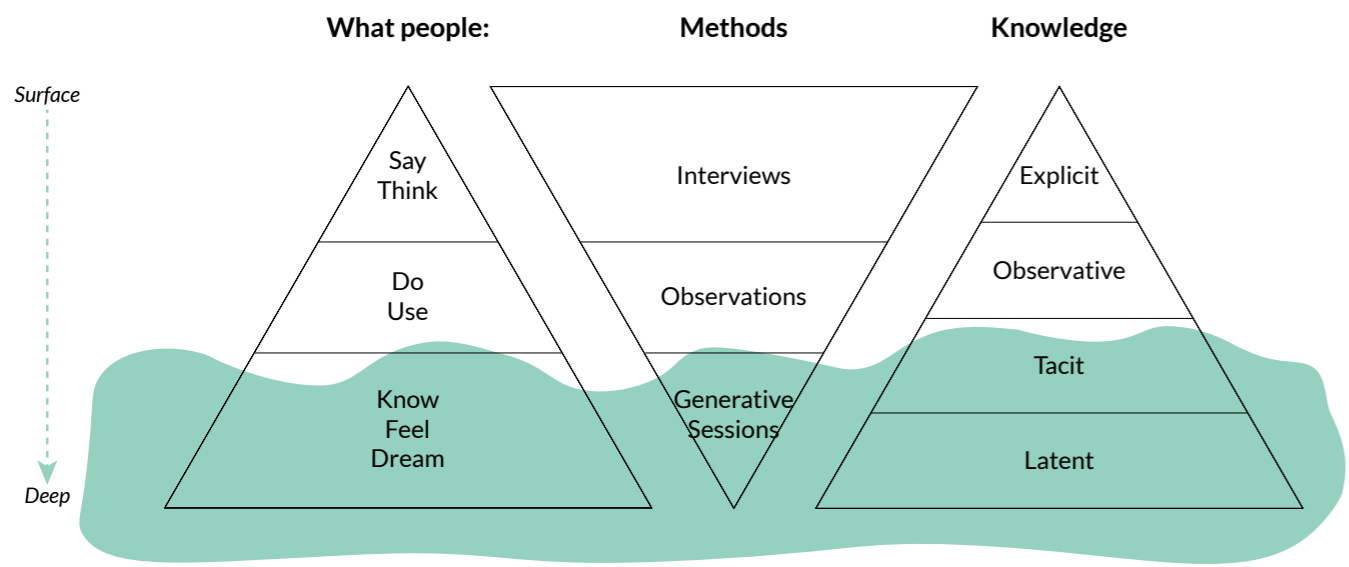


Figure 20:Methods to access different levels of knowledge

4.3. Participants

For the recruitment of the participants, a combination of convenience sampling and purposive sampling is used. The participants had to meet the following requirements: they had to be students at a Dutch university or college and had to live in the Netherlands. In total, six students participated in this research, of which four were female and two were male students. The students who participated in this research are all Dutch and living in the Netherlands, and all are master students at different Universities in the Netherlands and have different study disciplines. All of the participants were aged between 24 and 26 at the beginning of the research.

4.4. Sensitizing

Before the interviews, the students received sensitizing materials. Sensitizing is done to prepare the participants for the generative interview sessions by priming and activating them with tasks and assignments, taking them gradually from descriptive to imaginative (*Probes for Context Mapping - How to Design and Use Them*, 2020).

A sensitizing booklet is made in the program PowerPoint to meet the online circumstances the Covid-19 pandemic brings. The design of the booklet tries to be playful (so the participants consider it fun to work at and are encouraged to wonder and reflect freely), yet professional in appearance (so the participants also have the feeling they are taken seriously) (Visser et al, 2005). The sensitizing booklet focuses on recalling memories from the past and reflecting on them to get them in the right mindset. They could fill out the booklet in their free time to make them feel relaxed when doing the exercises.

Again, the layered approach was applied in this booklet. At the beginning of the booklet, the students are asked for their consent in participating in this study. Also, they are asked to disclose some personal information like age and education. Furthermore, they are asked to insert a picture of themselves to make the booklet more personal. The complete sensitizing booklet can be found in appendix B.

The first assignment (Figure 21) is made to make people aware of their purchase behaviour and why they buy certain things and consists of five steps. First, the students are asked to write down the things they

purchased during the week. Secondly, they are asked to indicate how they felt about this purchase using an emoticon. Then they are asked to explain why they felt that way to reveal the layer of needs. Also, the student is asked to write down where they purchased this thing and why.

This timeline exercise is chosen as it is a good way to get some factual data. By letting the participants start with filling out their factual information about their purchasing habits, they will start to be more perceptive of their environment as they are prepped to think about it in a different way (*Probes for Context Mapping - How to Design and Use Them*, 2020). This way makes it easier to ask them questions about the attributes they paid attention to when purchasing the product later on during the interview session.

The second assignment is making two association maps (Figure 22). The first

one is about their association with sustainability as sustainable awareness seem to influence people’s perception of (e.g. the psychological benefit) of products made of recycled plastic. The second association map is about their associations with products made of recycled plastic. The association maps are used to make the participants reflect on their knowledge and familiarity of the two subjects, which makes it easier to discuss during the interview session.

The third exercise is to let the participants state their opinion on five statements. These statements are based on the literature review. The statements are meant to provoke a bit to start a discussion during the interview session about their perceived risk/benefits with products made of recycled plastic and possible drivers and the reasons why. This page of the booklet is shown in Figure 23.

**This is what I am thinking at ...**  
Write down the associations you have with the following words. You can add more if needed.

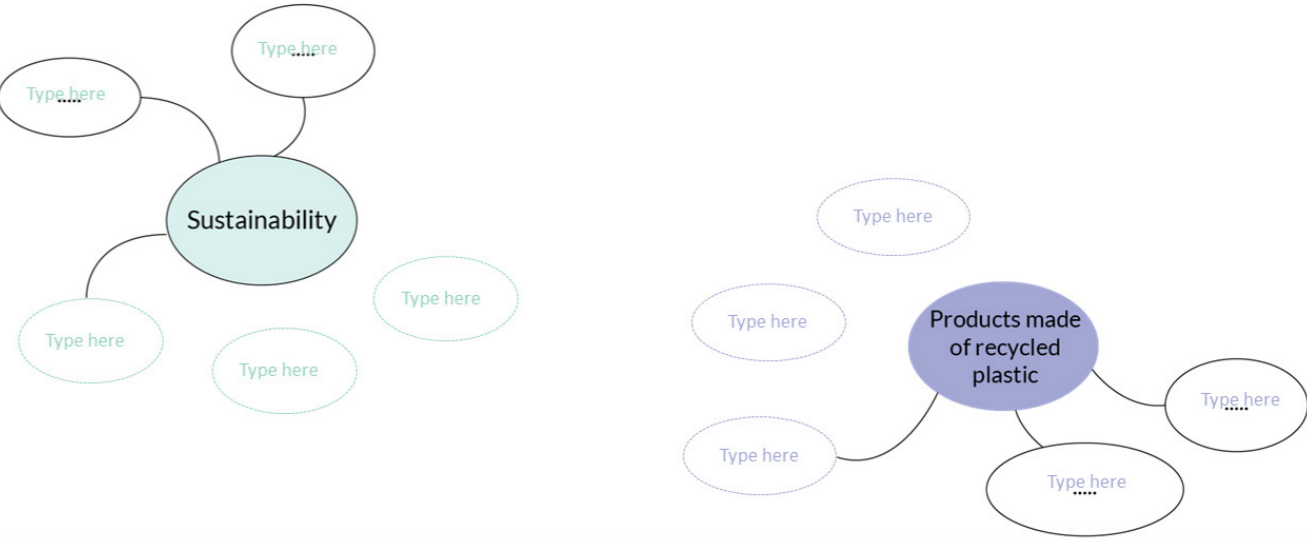


Figure 22: Sensitizing assignment 1

**This is what I buy in a day**  
Keep track on what you buy during a day in this week. This can be anything, for example clothing, a phonecase or a frisbee. Please follow the steps below. First, completely finish step one by writing down all the things you bought during that day before going to step 2. Do the same for step 2 etc. (continued on next page)

Step 1: What did you buy today?  
Write down the things you bought today in the circles on the line on the right.

Step 2: How did this purchase made you feel?  
Paste one of the emojis below that best matches your feeling when purchasing that thing.

Step 3: Why did you picked that emoji?  
Explain the reason why you felt that way.

Step 4: Where did you bought this thing?  
Write down where you bought this thing.

Step 5: Why did you bought it here?  
Please explain the reason you bought at there.

Type here	Type here	Type here	Type here
Type here	Type here	Type here	Type here
Type here	Type here	Type here	Type here
Type here	Type here	Type here	Type here

Figure 21: Sensitizing assignment 1

**This is how I think of the following statements**  
Indicate with the dot what matches you best.

I prefer products made of recycled plastic		I prefer products made of new plastic	
I know how a product made of recycled plastic looks like		I have no clue how to judge if something is made of recycled plastic	
The environment is top priority in my life		There are other important things in life	
I think recycled plastic products are gross!		Products made of recycled plastic are wonderful and hygienic!	
I like to show off and impress others		I don't care what others think of me and my behaviour	

Figure 23: Sensitizing assignment 1

## 4.5. Interviews

After sensitizing, an interview session is conducted with each individual student. The different parts of the sensitizing booklet are discussed to harvest the self-reflections of the students. First, the purchase timeline is discussed. The students are asked to dive deeper into the reasoning behind their purchase decision and why they chose this version and not another version. This process serves to get insights into their considerations and important elements that play a role when purchasing. Also, they are asked to elaborate if they would still buy the same product if this was made of recycled plastic. Secondly, the association maps are discussed to get an understanding of their knowledge on sustainability and products made of recycled plastic. It is asked if they pay attention to this themselves. Also, they are asked to explain if they see any risk/benefits in products made of recycled plastic and how they obtained their information about this. After this, the statements are discussed. They are asked to explain the reasoning behind their answers

After discussing the sensitizing booklet, the interview session continued with another exercise. The students are asked to give their first impression of the two pictures of Figure 25 and Figure 26. After they explained their opinion, more information is given on these pictures. I explained which parts in the pictures are made of recycled plastic to inspire and demonstrate some of the possibilities of recycled plastic. The students are asked to react to this explanation.

This exercise is added to provide the participants with more information eventually. This would make the conversation more smooth and interesting. Also, commenting and responding on something visual, in this case pictures, is easier than on something that is more abstract. These two pictures are chosen as these depict two environments that most students probably have encountered in their life and are familiar with, a bar and a shop. The environments look different from each other, but both contain products made of recycled plastic.



Figure 24: An anonymized screenshot of an interview session with a student



Figure 25: Bar & restaurant

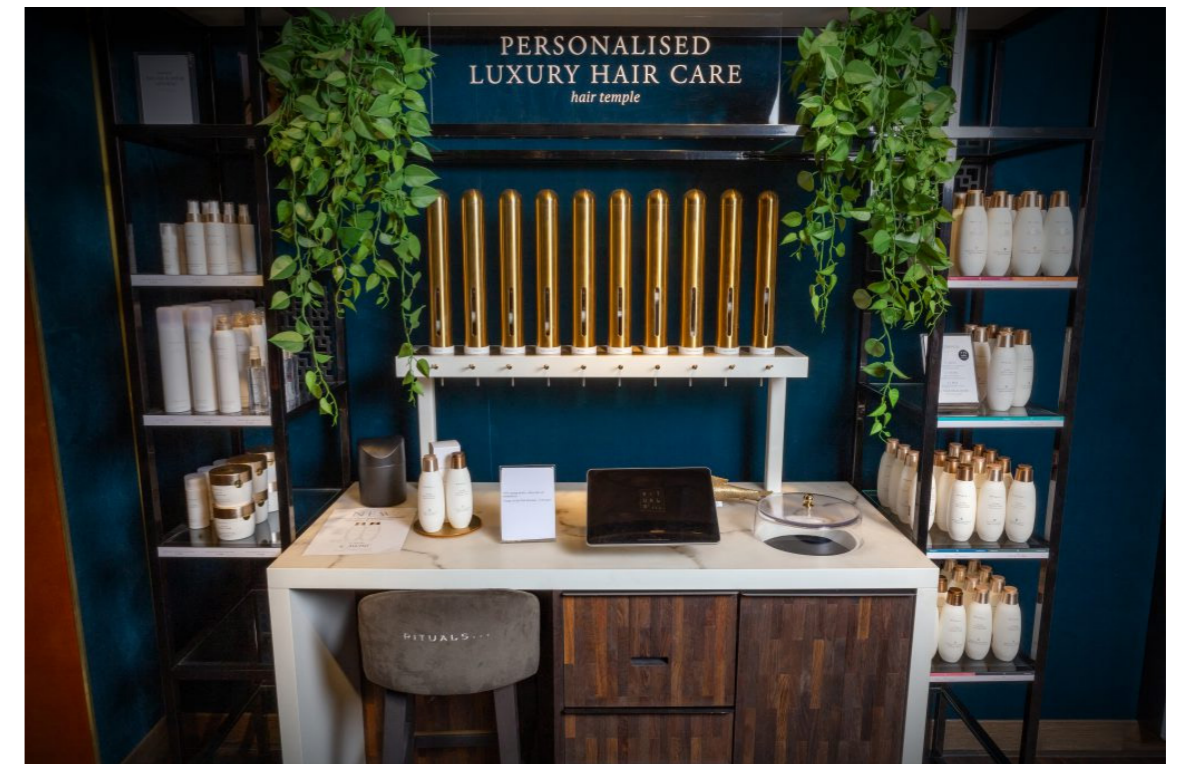


Figure 26: Shop with haircare products

The last part of the interview session was to project the desired future of the student by a collage making exercise. Collaging was a good accessible technique for this research to make the participants express their feelings, thoughts and ideas of products made of recycled plastic. The principle behind this generative technique is to let the participants make “designerly artifacts and then tell a story about what they have made” (Visser et al., 2005, p5.). These stories often contain rich information.

Again, the students are provided with a PowerPoint document that contains pictures and words to stimulate their associations and different levels of knowledge. There is tried to provide a balance between concrete and abstract

and between positive and negative images and words. This document can be found in Appendix C: Collage exercise. The students are asked to make a collage with the images and words of how they would be stimulated to buy and use products made of recycled plastic and what could help/support them with this. A canvas with a circle is added to provide them with a start and take away the “fear” of the blank canvas, but it is explained that they are free to use whatever canvas they prefer. Also, it is highlighted that the words and images are open for their own interpretation and that there is no right or wrong collage. Figure 27 shows an example of a student with her/his collage. The participants are asked to explain the collage they made.



Figure 27:Shop with haircare products

To summarize all the steps taken during the interview session, an overview was made. This overview was used as a flexible guideline for the semi-structured interview session (see Table 2). In this overview, the goal of each exercise is described. Also, the questions that are discussed during the interview session are depicted. The green titles are the exercises that here present in the sensitizing booklet. The purple titles are the exercises that are conducted during the interview session after discussing the sensitizing booklet.

	(FOLLOW-UP) QUESTIONS ASKED DURING INTERVIEW SESSION	GOAL OF EXERCISE
SENSITIZING	<b>Purchase timeline</b> How did you determine to buy this specific product and not another version? I can imagine there are several versions. What was the most important element in this decision? Is this more often an important element in your decision making? If this product would be made of recycled plastic, would you still buy it? Why/why not?	Recalling past and present purchasing memories
	<b>Sustainability Associations</b> What are your associations with sustainability? Can you explain this? Is this something you pay attention to yourself?	Checking students knowledge on sustainability, as this seems to have an influence
	<b>Recycled Plastic Associations</b> What are your associations with products made of recycled plastic? Can you explain this? Do you see any risk/benefits? Explain why? Do you know what happens with plastic?	Checking basic knowledge of students, what is known/unknown
	<b>Statements</b> Can you explain your answers to the statements? Why did you fill it out like that?	Statements based on literature to provoke discussion on their opinion
INTERVIEW	<b>Reaction on two example pictures</b> What is your first impression of these two pictures? Why do you think that?	Inspiring and informing on possibilities with recycled plastic. Reflecting on example
	<b>Collage making</b> How would you be stimulated to buy and use products made of recycled plastic? What could help/support you with this? Can you explain your collage? Why is that/could that be?	Projecting students desired future. How would they prefer this.

Table 2: Overview of the different steps of the interview session

4.6. Insights analysis

In this chapter, the analysis of the qualitative user research is explained. A qualitative analysis is used in order to gain insights and discover patterns. First, statement cards are made for every participant. These statements cards are clustered by an iterative process to see if there are overlapping or contrasting opinions. The clusters are transformed into insights. These insights provide an understanding of the experiences students have with products made of recycled plastic. Also, it provided a context profile and future desires that can be translated into opportunities for designing strategies.

4.6.1. Statement cards

All the interview sessions were recorded with the permission of the participants. This made it possible to make transcripts of each interview session. In order to analyze the results of the qualitative user research, statement cards were made. This is done by firstly reading through the transcripts of each participant. The interesting pieces of text and quotes are highlighted. These quotes are written down on a card. A statement is added to the card, which is my own interpretation of the quotes on that card. Multiple quotes can support one statement. Also, a title is added to the card. Figure 28 shows an example of one statement card. This is a translated version, as the original statement cards are in Dutch.

Statement cards are made for every interview, resulting in approximately 35 statement cards per student. The statement cards of each student are colour-coded, so it is possible to trace back which card belongs to whom when needed.

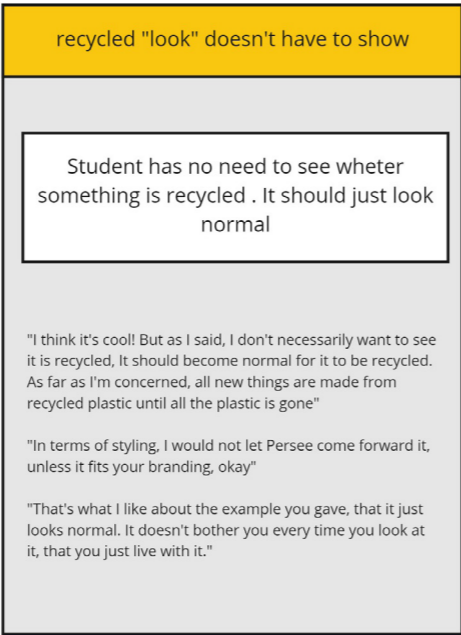


Figure 28: Example of a statement card

4.6.2. Clustering

The next step was to investigate if clusters could be formed with the statement cards made of the interviews. The clustering process is done with an open and explorative mindset. By an iterative process, overlapping or contrasting statement cards are grouped. An overview of these groups can be found in Appendix D: . Subsequently, a circle is drawn around each cluster group and a title of the cluster is written inside. These cluster groups are moved around and groups that had a relating element are connected. This resulted in a sort of variation of a Venn-diagram and Euler-diagram with multiple sets. This overview can also be found in Appendix D: . This overview is used as a starting point to investigate patterns and create a framework to communicate the insights.

4.7. Results: framework

The cluster overview provided a great understanding of students’ past, present, and future experiences with products made of recycled plastic. Furthermore, it provided insight into the context of the students in which these experiences take place. These insights formulated a context profile of the student (see Figure 29). Also, from the overview, two other stakeholders could be observed: the government and brands. Besides their experiences with products made of recycled plastic, the students provide great insight into what they think and expect from the government and brands regarding recycled plastic. The findings of how students perceive products made of recycled plastic, brands and the government are presented in detail in Figure 30, Figure 31 and Figure 32. Additionally, the findings of how the students wish to encounter future experiences with products made of recycled plastic are presented in Figure 33). Lastly, a framework is visualized of how the students, the government, brands and products made of recycled plastic relate to each other, from the perspective of the students. This framework can be found in Figure 34).

## THE STUDENT CONTEXT PROFILE

### The price is important

The students pointed out that they don't have much money to spend. Therefore when buying a product, the price is the most important attribute they pay attention to. They often go for the cheapest version of it or just above the minimum price available to still have some quality in the product.

On the other hand, when a student has more experience with certain products, they have a better judgement on the quality of a product and are willing to invest more money.

This is the same for products they intend to use very often or for a longer period. It is expected that a more expensive product has better quality and therefore last longer. In this case, more time and money is invested to compare the different available options to get a version that lasts a long time. In addition, the level of sustainability is taken into consideration in the decision process.

### Sustainable responsibility

In general, all the students are very aware of the environmental issues and agree that it is needed to take action. All are trying to limit their impact on the earth in their way. Everyone in society is responsible to do so, especially the ones that have the money to do so. The students try to make the sustainable choice as long as it fits their lifestyle. Only the possibility is not always there, as the sustainable option is often the expensive option. Therefore they share the opinion that the more sustainable (recycled) option has to be cheaper.

### Step-by-step process

Students try integrating sustainability into their lives, but this is a process. They are open to trying new things, as long as this fits their lifestyle and doesn't cost too much effort. Besides, the steps must be very clear and simple to implement.

### Selective knowledge and awareness

I believe the awareness and knowledge the students have is selective as they all have a high level of education. The students indicated that they gained their awareness and knowledge of sustainability and recycled plastic products during their studies. This caused that they have some sort of intrinsic interest in these topics. They notice this is not the case for all generations and levels in the society, for example, their parents, and think more public awareness is still needed.

### Social network is inspiring

Friends and social network has a positive influence on the behaviour of the student. They like to share experiences and rely on experiences (with products) and reviews of others.

In addition, the students agree that it feels good when you are accepted by the people around you, but your actions have to come from within yourself and your interest. They don't like virtue signalling. Also, they don't like it when people are judgmental and criticising their behaviour when they try to be more sustainable or when they simply don't have the possibility to make the sustainable choice.

They like to motivate each other with tips and tricks towards a more sustainable life, but this mustn't be done to show off your good behaviour. So inspiring others by showing their enthusiasm, not by forcing them.

"I'm just a student and I think it's all very expensive"

"If you have more experience with a certain product, I am willing to spend more money on it because then you use it more often"

"What I find so annoying is that it's so obvious that we're just literally causing a climate disaster and then so many people bury their heads in the sand"

"It will be easier for me if the non-sustainable option is more expensive and more the sustainable option cheaper and more easy available"

"I do those easy tricks."

"We have studied how to make plastic, so then you understand how hot it gets before you can mold it and what happens to it"

"Try to make them feel comfortable, people should be enthusiastic and not feel forced, there is a clear difference. Because of my enthusiasm I want to inspire them and not force them"

"But I really hate virtue signaling. You gotta do it because it's a good thing"

## WHAT STUDENTS THINK OF PRODUCTS MADE OF RECYCLED PLASTIC

### The more the better!

The students share the opinion that the more made of recycled plastic, the better. As far as they are concerned using recycled plastic should be the standard. If they would know it, they prefer a product that is made out of recycled plastic. Also, they point out that they are annoyed by all the plastic that is used in supermarkets these days. Non-functional plastic feels like a waste.

### Hip and surprising

The students also indicated that products made of recycled plastic are often hip and surprising. They associate plastic recycling often with innovative ideas and want to support those people who developed them. They are curious about the possibilities of recycled plastic and want to be inspired

### No clue how to judge

Although the students indicated they have some intrinsic interest in the topics of sustainability and recycled plastic, they stressed having no idea how to judge or evaluate if a product is made of recycled plastic or not. They don't encounter it in daily life, so this information doesn't just come at them. Also, they think the term "recycled plastic" is vague, as they don't know what the differences are between products made of recycled plastic and virgin plastic and it isn't clear how much recycled plastic a product contains. They doubt if it is possible to recycle every kind of plastic. They would like to have more insight into this.

### Not dirty at all

Nevertheless, students don't think products made of recycled plastic are dirty or contaminated. They think it is crazy when people have these thoughts. They perceive them as just as clean as products made of virgin plastic. This is because they understand a bit how plastics are made. As you have to make the plastic very hot to be able to mold it, all the bacteria and traces of a previous owner will be gone.

### Budget version

Some students have this image stuck in their heads that recycled plastic is mostly used for products in which not a high quality is expected, like plastic bags. Besides, plastic in general feels more like the budget version of a product, compared to products made of more natural materials like wood or glass. It comes across if it is the cheaper option which is less durable.

"Yes, I think it is very good, I'd do buy it. Rather recycled than from new plastic."

"I think they are cool and innovative, really nice ideas often. Like, look what those people came up with! Creative things, I also associate that with things from recycled plastic"

"That I have no idea how to judge whether something is made of recycled plastic and what quality it brings."

"I just hardly come across it in my own life"

"I don't think it's going to make us sick or anything. People who think that are a little crazy"

"I think it's just as clean as a new plastic bottle. I don't care. I think it's dirtier to drink from a glass from the pub."

"I find plastic in general the budget, a lesser option compared to wood or glass."

Figure 29: Context profile of the student

Figure 30: What students think of products made of recycled plastic

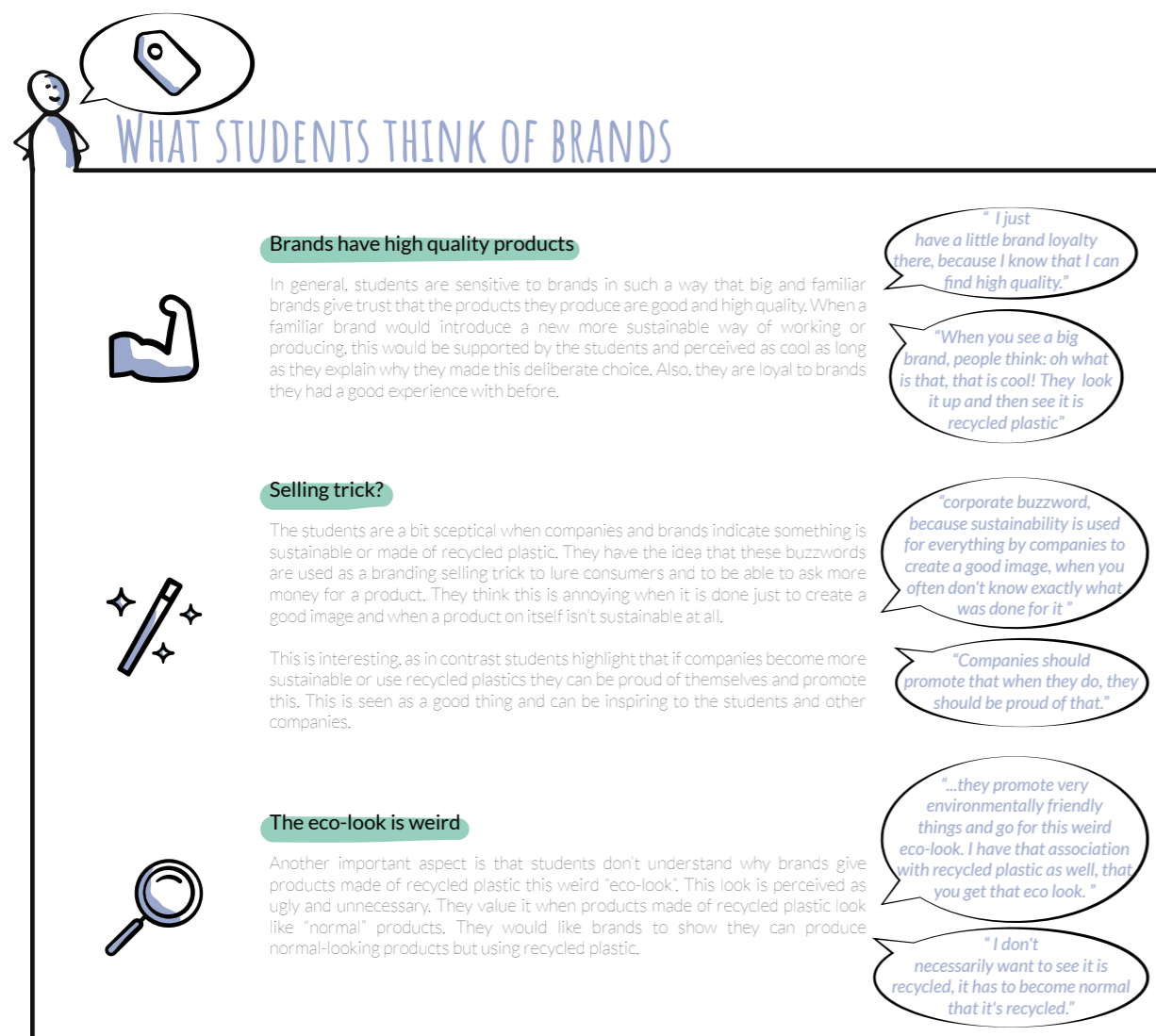


Figure 31: What students think of brands

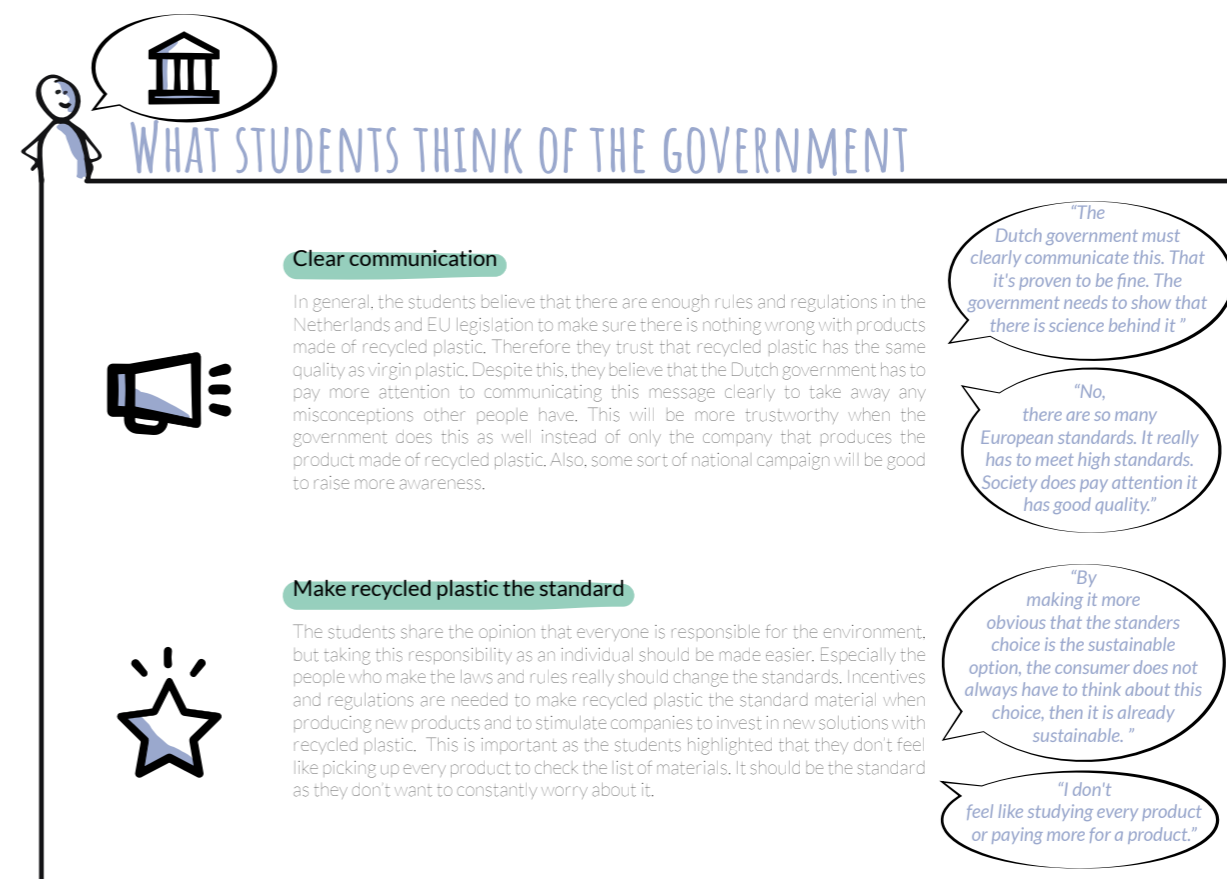


Figure 32: What students think of the government

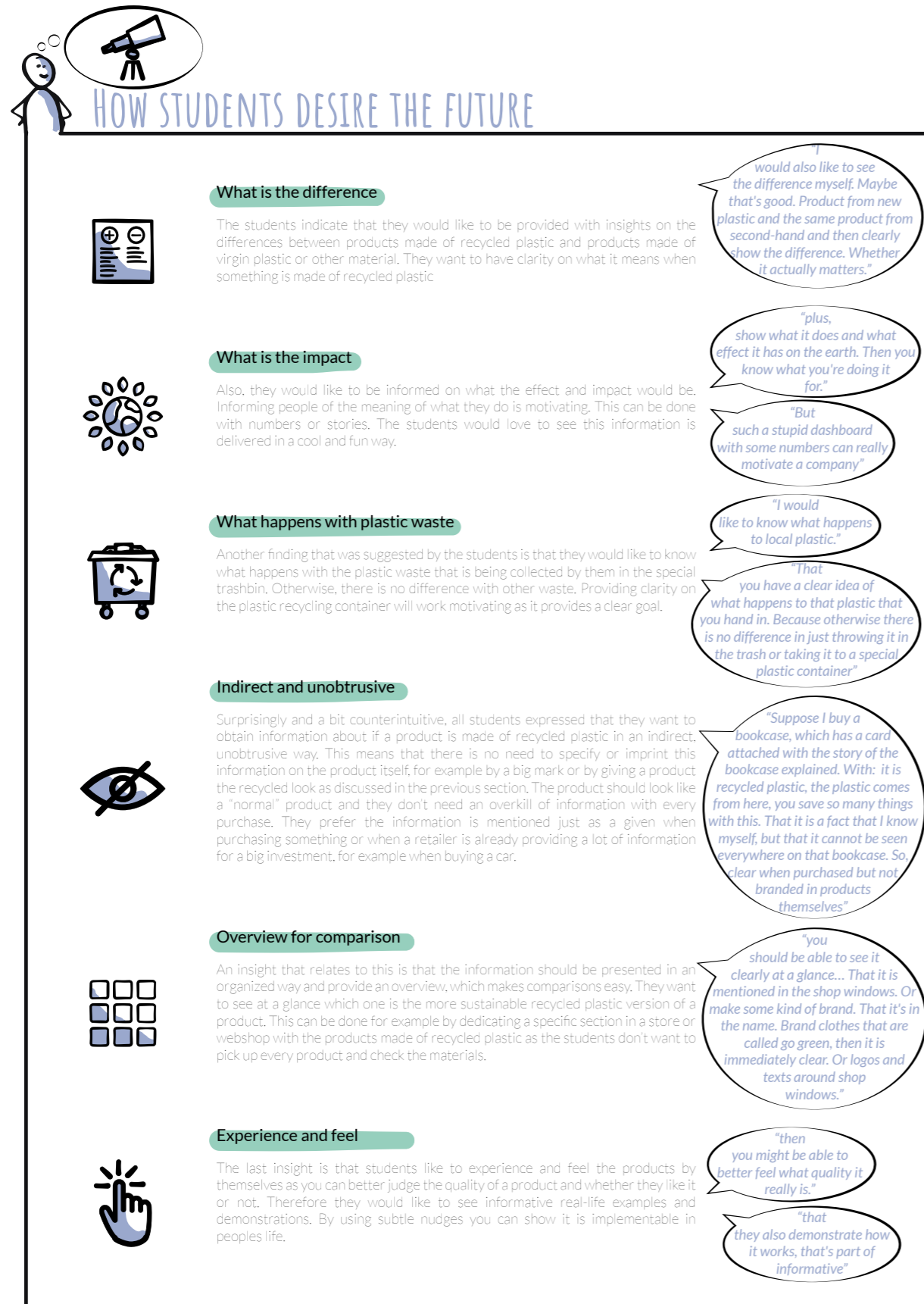


Figure 33: How students desire the future experiences with products made or recycled plastic

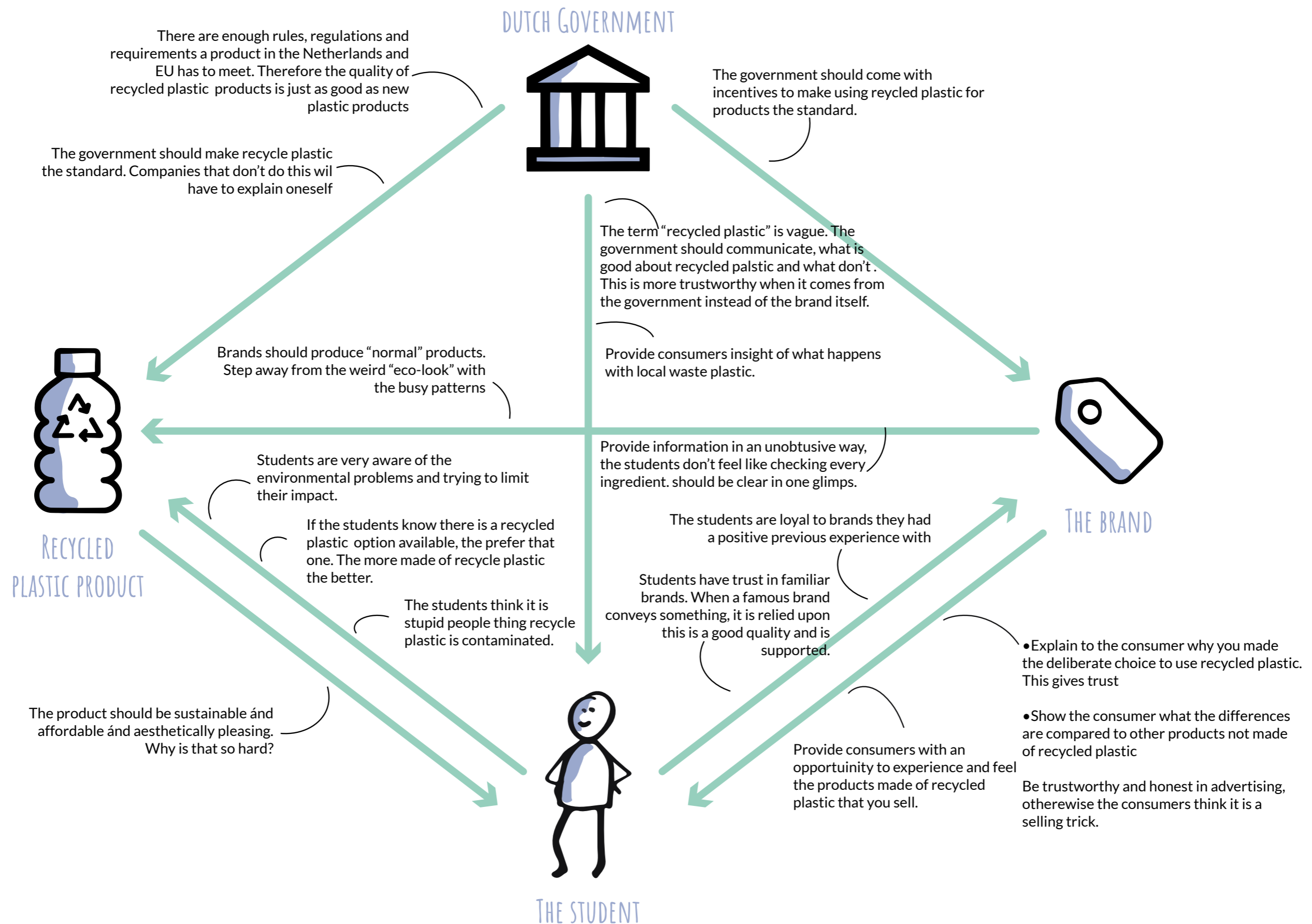


Figure 34: Framework of the relations of the students perceptions



## 5. DESIGN RECOMMENDATIONS

Based on the qualitative user research results and the literature review, design recommendations to stimulate consumers' acceptance of products made of recycled plastic are formulated. This is done by first looking at the results of the qualitative user research and writing down the elements that must be considered to fit the students.

The complete list of elements can be found in Appendix D.

Secondly, these elements are brought together with the findings from the pressure cooker and the literature review into the design recommendations for increasing the consumer acceptance of products made of recycled plastic. Of course, these design recommendations are interconnected with each other, as will appear from the descriptions of them in this section. For example, exploiting a strong brand name will enhance the level of trust, but it will also help in increasing the public familiarity with products made of recycled plastic. The other way around, the more experience or familiarity with the products, the more trust in the products.

### Inform about product details

**What?** Consumers expressed a need for information about the product made of recycled plastic. In order to meet this demand, detailed information about the product made of recycled plastic should be disclosed to the consumer. Consumers need to be fully informed to make an effective purchase decision (Bray, 2010). The term “recycled plastic” is often experienced as vague, and consumers do not know what it exactly means. Disclosing what is meant with “recycled plastic” for a specific product allows consumers to make a better informed decision, taking away insecurities about their knowledge. Informing consumers about the product details will also help to avoid cynicism. It is important to provide consumers with a better understanding of why recycled plastic is used for a product by emphasizing and explaining the benefits of using recycled plastic for the product with strong, trustworthy information (Metthes & Wonneberger, 2014). A good example of providing the consumer with details about the products is the company Viltr in a visual and clear way. In their products descriptions (see Figure 35), they provide information about how much plastic bottles are recycled to make the product, how much per cent of the product is recyclable again, and the unique benefits of the material

### How?

Disclosing detailed product information can be made visual by numbers or graphs as this makes it easier for consumers to understand. The information that needs to be included is:

- How much recycled plastic material does the product contains. This can be done by describing it in a percentage or by how much plastic waste is used. In my opinion, a combination of both is best as providing only the amount of waste plastic still brings unclarity as it does not have to mean the product consist 100% out of recycled plastic.
- Being transparent about the production process, such as where the (recycled) material comes from and under what conditions it is produced. Consumers showed to be willing to pay 2 % to 10% more from a company that shows transparency about their product and production (Bateman, & Bonanni, 2019).
- Inform if the product is recyclable after usage.
- The effect/impact on the earth (environmental benefits) and therefore the impact the consumer can make. Consumers tend to be more positive toward advertisements with specific and detailed information about environmental benefits (Jamar, 2020). For example, how much carbon emission or water is saved by using recycled plastic.
- Emphasizing the durability of the recycled plastic. For example, the mix plastic have a lifetime of 50 years and can be recycled up to seven times (Save Plastics, 2019), which provides almost a lifetime guarantee of the product.

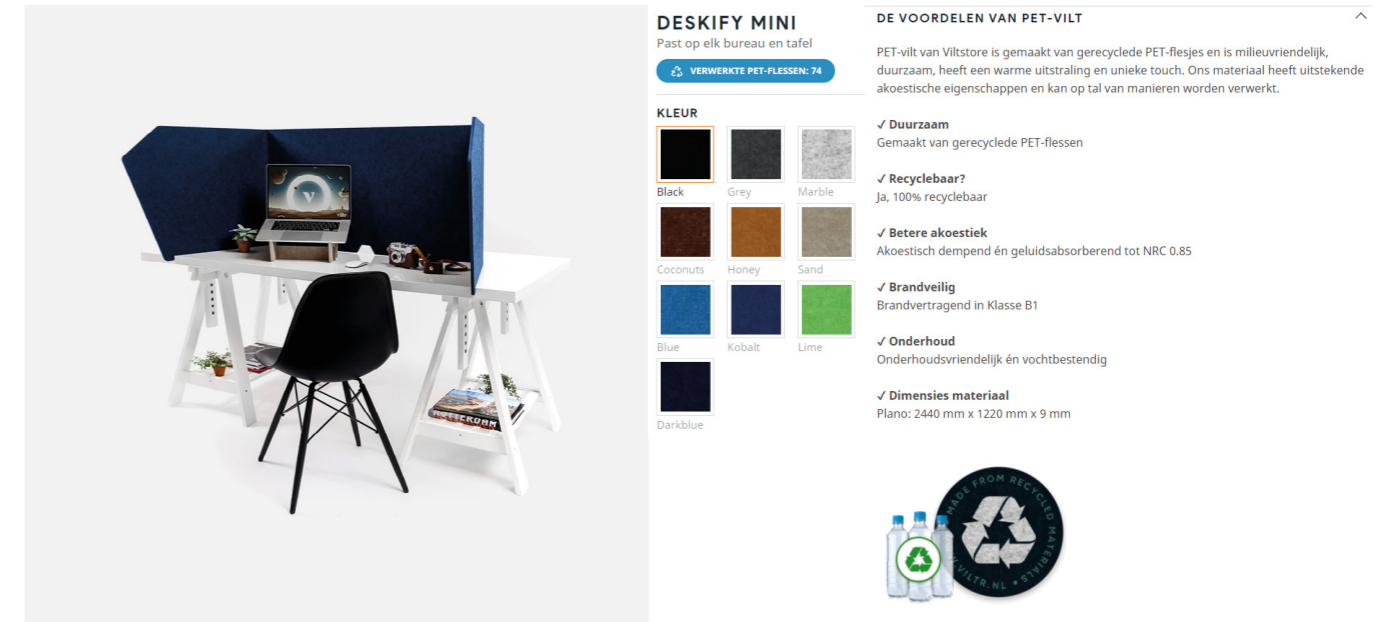
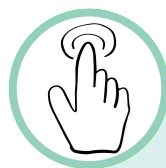


Figure 35: Assembly of screenshots from the Deskify product by the company Viltr. This company makes products made of recycled plastic. This is a good example of providing information about the products to the consumer. It informs about how much of the product is made of recycled plastic, how much plastic is recycled and if it is recyclable after usage.



### Make the future tangible

**What?** Consumers experience difficulties grasping the future benefits of purchasing products made of recycled plastic as it demands abstract thinking (Johnstone & Tan, 2014). Therefore it is needed to bring this physical distance closer to the consumer by making the future more tangible and apparent in the present for consumers.

#### How?

- Provide consumers with a challenge they can commit to; consumers are more intrinsically motivated when working towards a goal with a meaning (Santos-Longhurst, 2019; Malone, 1981). An example of such a challenge could be eating no meat or not buying new clothes for one month.
- Provide consumers with information on the direct consequences of their actions. Positive feedback leads to higher intrinsic motivation (Deci & Ryan, 2000). This could be an extra thank you message when a consumer purchases the recycled plastic version of a product. Another example is awarding people with a stamp every time they bring their own coffee mug. With a certain amount of stamps, they can get a free drink.
- Provide the benefits and effects of the products made of recycled plastic on a local level. In this way, it becomes more personally relevant than when consumers read about the effects globally (United Nations Environment Programme [UNEP], GRID-Arendal & Behavioural Insights Team [BIT], 2020). Also, participants indicated that they would like to know what happens with the locally collected plastic. The municipality of a city could be an essential and trustworthy provider of this information to their citizens.



### Make it attractive

**What?** Consumers are more likely to purchase a product made of recycled plastic when they feel attracted to it. Therefore the product should capture the consumer's attention, not only in the sense of product appearance but also by aligning with their beliefs and if they perceive it easy to implement in their lifestyle.

#### How?

- Participants of this study indicated to highly dislike the “recycled” plastic or “eco” look with a colourful pattern (see Figure 36) and preferred products with a more normal/neutral looking appearance. Therefore a classic, timeless design is advised for products made of recycled plastic (see Figure 37). Besides, timeless designs are perceived as more durable, linked to the perceived quality of a product (Niinimäki & Hassi, 2011). A logo or label can indicate the fact that the product is made of recycled plastic, so it could be visible to others but is not in your face. This may also reduce the perceived quality reduction of products with explicit environmental friendly attributes (as discussed in the literature review)( Newman et al., 2014), as the products have a more normal/neutral appearance.
- This study indicated that participants make a sustainable choice as long as it fits their lifestyle and is easy to do. If it is too hard to be green, it leads to inaction (Johnstone & Tan, 2014). Therefore the recycled plastic product should feel like an easy, attractive option to go for. This can be done by providing some simple/steps or examples consumers can integrate without much effort. In this way, consumers still feel in control of their decisions, which is an intrinsic motivator (Figure 38). Awareness of such simple steps should be created by well-known institutions or companies or even a national campaign by the government.
- Make the products made of recycled plastic attractive by positive promotion. Not only by highlighting the product's environmental benefits but also by evoking positive emotions, making the consumer feel good about himself. Consumers are often motivated by the desire to have fun or be social and therefore “tend to find messages based on pride, fun and humour more compelling than those based on guilt.” (United Nations Environment Programme [UNEP], GRID-Arendal & Behavioural Insights Team [BIT], 2020, p.18).



Figure 36: Example of a less timeless design. It is very apparent that the product is made of recycled plastic. However, consumers indicated to dislike the busy patterns products made of recycle plastic often have (StudioSmelt).



Figure 38: Example of providing consumers with an easy step to take. The “voedingscentrum” [nutrition centre] shows consumers easy food switches that can be made, that are more healthy and sustainable.



Figure 37: Examples of more timeless designs made of recycled plastic. There are still some visual cues that indicate that the products could be made of recycled plastic, but these are way more subtle as in the example of Figure 36.



### Make it fun

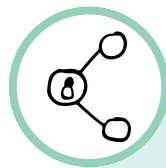
**What?** When something is “fun”, consumers are more intrinsically motivated to perform a particular behaviour or learn (Malone, 1981). Therefore, it is important to create fun, pleasant interactions and emotions with products made of recycled plastic. In this way, a positive association or experience can be stimulated, which is essential as consumers rely on past experiences in their decision-making process. Participants of this study indicated that they perceive products made of recycled plastic to be surprising and innovative and are curious about its applications and possibilities. They also indicated that they are interested in learning about products made of recycled plastic, but in a fun way, not by just reading very long texts. This surprise factor should be emphasised as surprising feedback is a good way to spark curiosity. Malone (1981) describes curiosity, challenge and fantasy as the important intrinsically motivating factors for fun learning environments. An example of a fun learning environment is the video game Minecraft education edition, one of the entries of the Green Game Jam (see Figure 39). In an annual green game jam, game developers are activated and supported to include green activations in their games to stimulate sustainable behaviour change in their players.

### How?

- Curiosity can be triggered by a novel and surprising environment but not too complex for the consumer. Two sorts of curiosity can be evoked. The first one is sensory curiosity, in which a consumer's attention is drawn towards sensory stimuli of an environment such as light or sound. Cognitive curiosity is evoked by the desire of people to bring form to their knowledge and is triggered by providing consumers with just enough information to make them motivated to learn more about the incompleteness (Malone, 1981), for example, a story of which you want to know the end to achieve completeness.
- Providing consumers with a challenge helps them to work towards a goal as they are driven by the desire to mastery. When the challenge is completed, consumers feel better about themselves (Santos-Longhurst, 2019; Malone, 1981). A goal is challenging when a person is between certainty and uncertainty of reaching the goal. This balance can be achieved in four ways: choice of difficulty, different levels of goals, hidden information (also contributing to curiosity), and randomness (Malone, 1981).
- Fantasy includes evoking mental images (physical/virtual objects or social situations) to encourage a behaviour. It can be stimulated by analogies, metaphors or themes. For example, the Efteling or Disneyland can be seen as highly intrinsically motivating environments evoking a lot of fantasies. Another example is the motivational app Forest, in which trees are planted for the time you are focused.



*Figure 39: The UN launched the Playing for the planet alliance. The alliance members integrated green activations in their games, reaching more than 1 billion video game players. Also, they reduced their emissions, ranging from a reduction of plastic in their products to planting trees. The alliance also organises the annually Green Game Jam, in which game companies can showcase their green activations and win an award. The Minecraft education edition was one of the entries. It provides a wide range of lessons for a sustainable city, such as managing waste products. This is a good example of combining education about environmental problems with fun.*



### Create social influence

**What?** Consumers tend to be influenced heavily by what others think of them and desire to fit in with the social norm (Gifford, 2011). This is in line with the qualitative research findings in which the participants indicated that it feels good when accepted by friends and the people around you. Consumers like to share their experiences with a product with others and rely on the experiences of others. Contrary to what was suggested in the literature review as a strategy to encourage the purchase of recycled plastic products, the participants expressed negative perceptions towards status signalling with a green product or behaviour by other consumers. Sharing information about a product (made of recycled plastic) should be done out of a consumer's own interest and enthusiasm for the product. Of course, there is a thin line between whereas the purchase of a product made of recycled plastic is motivated by: 1) self-signalling, contributing to a positive image of the self without considering perceptions of other consumers; 2) Self-identification, in which a consumer seeks to signal information about himself to other consumers in order to fit in the group; 3) or by social identification, in which showing of a certain status is the main driver (Trudel, 2018).

### How?

- Provide consumers with the opportunity to share their experiences with products made of recycled plastic with friends. Consumers rely on the recommendations of their friends and like to be inspired by them. Besides, when a high level of risk was perceived because of an unknown brand, consumers seek information from others to reduce the perceived risks (Mitchell & McGoldrick, 1996). Consumers are also influenced by a store image that is created by comments and reviews of other consumers (Hse et al., 2008). The other way around, consumers would like to share their enthusiasm about a product (made of recycled plastic), resulting in enthusing and inspiring each other. For example, Airbnb Experiences or Trip Advisor are both platforms that are all about sharing experiences and inspiration with others (see Figure 40).
- Provide opportunities for social comparison (Kok et al., 2016b). For example, by highlighting the purchase behaviour of others. When consumers think that the majority of people is purchasing products made of recycled plastic, they are more likely also to purchase products made of recycled plastic. If this behaviour is growing, it can be published as a fact, for example, by stating that more and more people purchase products made of recycled plastic. Brands can also contribute to this. Linking the product made of recycled plastic to a well-known brand can give consumers the feeling that it is a popular product that is being purchased by many consumers, and if all those other consumers are purchasing it, they must be satisfied with the product (Mitchell & McGoldrick, 1996).
- Team up and challenge consumers to take action together. Cooperation and competition are both intrinsic motivators (Santos-Longhurst, 2019; Malone, 1981). Cooperation satisfies the need for acceptance (self-identification). Also,

personal satisfaction can be felt by helping others and working together to accomplish a common goal. Competition provides “a challenge and increases the importance we place on doing well.” (Santos-Longhurst, 2019, Intrinsic motivation factors).



### Online Experiences around the world

Book and join one-of-a-kind activities from your home.

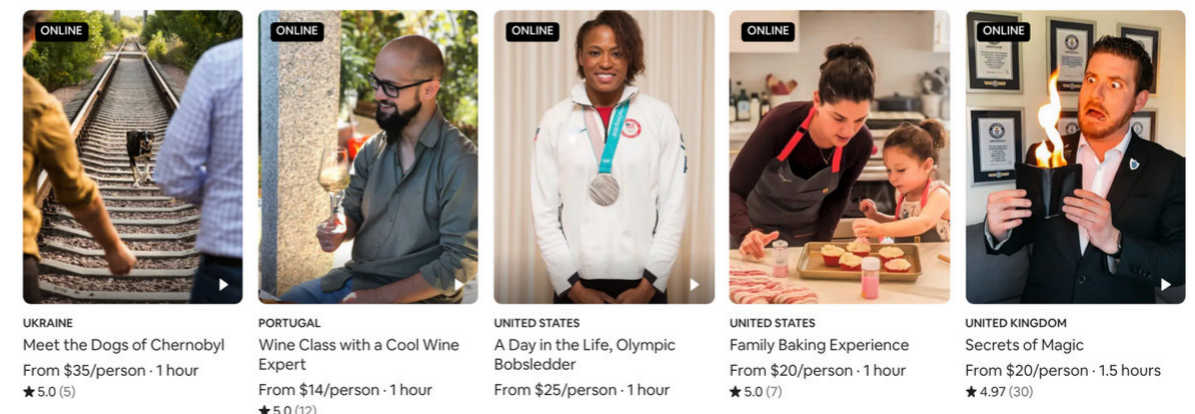


Figure 40: Trip Advisor and Airbnb Experiences are both online platforms that are designed to share and recommend experiences and inspiring places with/to others. People can evaluate their experience by leaving reviews and grades



### Stimulate try-out

**What?** Consumers are hesitant to purchase products made of recycled plastic as they often have no previous experience with the products to base their evaluation on. Also, participants of this study indicated they would like to judge the quality of the products for themselves before purchasing the products. Therefore, consumers should be provided with the opportunity to try and feel the products made of recycled plastic before they purchase to assess the products for themselves. Thereby, a positive try-out experience with products made of recycled plastic makes consumers more likely to purchase a product made of recycled plastic themselves and share their experiences with others (Deana, 2020), which would also contribute to creating social influence (also discussed in this chapter).

### How?

- Providing consumers with free sample (Roselius, 1971) versions of the product is a way of offering a tryout opportunity to consumers. These samples of the products can be handed out at events and other places that are often visited and easily accessible for consumers, such as train stations, shops, and supermarkets. Online stores can offer the possibility to order a sample version as well. This is often done, for example, in the furniture world, in which it is possible to order a sample piece of fabric to judge if the material and quality of the fabric is right for the sewing project (see Figure 41).
- A bit related to offering free samples is offering a free trial period for the product made of recycled plastic. A trial opportunity, in which the consumers can test out the product for a certain amount of time, is a successful way of reducing perceived risks with a product (Mitchell & McGoldrick, 1996) and can be offered by brands and retail companies to increase the purchase decisions of products made of recycled plastic.
- Providing consumers with a demonstration of the product made of recycled plastic is another way to stimulate experience before purchase. A demonstrating event in which products made of recycled plastic are presented to the consumer is also a way to exhibit surprising (new) possibilities of what can be made with recycled plastic, triggering curiosity or even fantasy (discussed in *fun*). Demonstrations of products can be given in stores or product launch campaigns, but also by exhibitions in museums as here often surprising, inspiring things/pieces are shown.
- Shopping around could also be a good risk reliever for when there is no previous experience with the product by the consumer (Mitchell & McGoldrick, 1996). By shopping around, the curiosity of all the available options is satisfied, and it provides an opportunity to compare brands, product attributes and prices. This makes it possible for the consumer to judge the product made of recycled plastic. However, shopping around can be time-consuming.



Figure 41: Example of a website providing free fabric samples to test and feel the fabric at home before ordering the real product (pillows).



### Stimulate familiarity

**What?** The pressure cooker, literature review and qualitative user research highlighted that consumers do not feel familiar with products made of recycled plastic. This unfamiliarity makes it harder for consumers to evaluate the risks of a product made of recycled plastic. Participants felt that they don't really encounter products made of recycled plastic in their daily lives. However, they also indicated that using recycled plastic for products should be the standard. Therefore, it is important to increase the public support and familiarity of products made of recycled plastic to make recycled plastic the "normal" perceived material to use for new products.

### How?

- Products made of recycled plastic have to be "accessible" in a consumers daily life. This can be done by placing products made of recycled plastic in public spaces and places that are often visited and accessible for consumers, such as train stations, cafes, public parks, shops or other public areas. In this way, consumers of all levels and generations of society can encounter them in daily life and familiarize themselves with them. In this way, consumers can be shown that recycled plastic is a strong and valuable material for products. Besides, in this way, consumers can interact with the product made of recycled plastic, creating a try-out experience, which is also described in this chapter. Also, public objects possibly decrease the perceived contamination of products made of recycled plastic as it is not an intimate (close to the skin) product (Baxter et al., 2017). However, it is important that consumers are made aware of the fact that the products are made of recycled plastic; otherwise, they still will not know it. This should be made clear by using a logo or sign possibly accompanied by an explanatory text with product details to inform the consumers about the benefits, which is also discussed in this chapter. Figure 42 provides an example of a publicly accessible library with shelves made of recycled. Additionally, the library is designed by the well-known architectural office MVRDV.
- Another way to increase familiarity is to exploit a strong, well-known brand name. As mentioned before, many consumers rely on a brand name as an indicator for quality (Hamzaoui-Essoussi & Linton, 2014; Mitchell & McGoldrick, 1996). Familiar brands often have a large group of loyal constituencies and, therefore, a broad audience reach. Information about products made of recycled plastic provided by a well-known brand or products made of recycled plastic produced by the well-known brand will reach a broad public, contributing to the general familiarity with products made of recycled plastic; When something is seen more often, it becomes more familiar to a person. It will stimulate consumers view that recycled plastic is the "normal" material to use in production because the big brands are using it.
- Familiarity with products made of recycled people can be spread by the influence of "famous" people or people with public recognition. Celebrities

or influencers have a large range of people and are often seen as exemplary roles. When they would use or promote products made of recycled plastic on, for example, social media platforms or on prestige events, this will catch the attention of many people. Endorsements by celebrities is a way of perceived risk reduction (Mitchell & McGoldrick, 1996). Collaborating with influencers or celebrities is a well-known strategy among brands as well, as it increases consumers' awareness of advertisements and shows consumers that the brand has a good reputation and products. This is mostly done by offering the celebrity something in return, such as a product discount. However, the image and the reputation of the celebrity or influencer itself are important (Rafique & Zafar, 2012).

- To create more familiarity with products made of recycled plastic, authorities such as the government or municipalities need to promote the products made of recycled plastic as well. Working together with the industry will contribute to the correct perception of products made of recycled plastic (Sun et al., 2017). National awareness campaigns can significantly influence changing the behaviour of consumers and spreading the word about products made of recycled plastic. The participants of this study also highlighted this. They thought the Dutch government could pay more attention to communicating the right message about products made of recycled plastic to take away the misconceptions. An example of a successful national campaign is the BOB-campaign in the Netherlands, in which awareness is raised to change the behaviour of drinking alcohol while driving (Ministerie van Algemene Zaken, 2018).



Figure 42: A good example of using recycled plastic in a public, accessible place is this library in Spijkenisse, The Book Mountain. All the bookshelves are made of recycled plastic by the company Lankhorst Recycling Products. Also, the design of the library is made by the internationally renowned architectural office MVRDV (Lankhorst Recycling Products, 2012). The Book Mountain describes itself as "an important, freely accessible, knowledge- and information centre for Spijkenisse and her citizens" (Dirty Science, 2017)(image adapted from Dirty Science, 2017).



### Build trust

**What?** According to the research and the study, trust and trustworthiness seem to be important factors in accepting products made of recycled plastic. The more trust consumers have in a product, the more likely they are to purchase them. Therefore it is essential to apply strategies to enhance trust in products made of recycled plastic.

### How?

- The participants of this study trusted that there are enough rules and legislation in the Netherlands and the EU to make sure that a product made of recycled plastic passes all inspections. Besides, they put trust in the authorities to take the right measurements to make recycled plastic the standard material to use by manufacturers for new plastic products and stimulate companies and manufacturers to invest in new solutions with recycled plastic with incentives. In this way, the consumers are guided indirectly, as forcing consumers with legislation can result in resistance towards it due to the lack of trust (Trudel, 2018; Gifford, 2011). However, authorities can play a major role in increasing the level of trust among consumers. As discussed before, authorities need to take away misconceptions about products made of recycled plastic, increasing the trust in the quality and safety of the products. Participants of this study indicated that endorsements of products made of recycled plastic by the government would increase the trustworthiness of the information provided by brands or manufacturers about products made of recycled plastic, in comparison when this information is only provided by the brand/manufacturer himself. Also, perceived risks are reduced when a brand is tested and proved by the government (government testing) (Hsu et al., 2008).
- Exploiting a strong, well-known brand name is a way of enhancing trust. Consumers have trust in major brands (Hse et al., 2008). As discussed before, a well-known brand is an indicator of good quality. Also, consumers think that complaints will be better dealt with by popular brands as they have a reputation to maintain and that the brand, therefore, will not do anything that could harm this reputation (Mitchell & McGoldrick, 1996). Besides, brand loyalty, one of the strongest strategies for risk reduction (Roselius, 1971), enhances the acceptance of messages or new products of the brand because of positive past experiences with the brand (Hsu, Chen, Weng, & Lin, 2008; Mitchell, & McGoldrick, 1996). This was also mentioned by the participants of this study. To enhance the trust in a brand, they must be transparent about their production process (Bateman, & Bonanni, 2019). For young, not so familiar (yet) brands, co-branding with a strong brand will be a good strategy to enhance the trust in their products as the familiarity, knowledge and affections are transferred from the well-known brand to the lesser-known brand when there is a good congruence (Jamar, 2020; Martin & Stewart, 2001), as was mentioned in the literature review.
- A well-known store image also enhances the trust in the products and brands being sold by the retailer as consumers rely on the reputation of the store (Hse

et al., 2008). ; Roselius, 1971). When consumers do not know to which vendor to go, they often choose the one with a “famous” store image. Therefore it would be beneficial for the young, unfamiliar brands to collaborate with a vendor that already has a good store image to enhance the trust in their products. In order to ensure a good purchase decision, consumers often contact the sales personnel of the store to ask questions (Hse et al., 2008). Therefore the personnel or customer service should be easy approachable/accessible. Mitchell & McGoldrick (1996) indicated that it remains a bit unclear what determines the store image. Is it relating to the sales personnel, the advertisements or the store’s interior, or is it the total concept a person associates with the store. For online shops, the store image is mainly created by reviews and comments of other consumers (Hse et al., 2008).

- Providing a warranty or money-back guarantee with products made of recycled plastic reduces the perceived risks in the products, especially the perceived financial risk, and gives more trust in the purchase (Hse et al., 2008). Besides, in some cases, a lifetime warranty could be given for products made of recycled plastic. The company Save Plastics, for example, provides a lifetime warranty as their recycled plastic last for almost 50 years. (Save Plastics, 2019).
- Providing after-sale services is another way to reduce the perceived risks of products made of recycled plastic, enhancing the trust in the product’s performance (Hse et al., 2008; (Mitchell & McGoldrick, 1996). In this way, the consumer will have the insurance they will lose minimal time as the product will be fixed or replaced with a temporary version when the product fails. Relating to this is offering the products made of recycled plastic as a Products-Service System (PSS). A PSS is “an integrated product and service system which consumers can access the use of, without acquiring ownership of it” (Catulli et al., 2013, p.5) and is a more sustainable way of consuming, contributing to the circularity of the products. It improves the relationship between the supplier and products that are broken are withdrawn from circulation (Catulli et al., 2013). A PSS provides the consumers with trust as they know that the service provider will be responsible if the product fails. A good example is the company Swapfiets (see Figure 43), which guarantees an always working bike for a monthly fee (Swapfiets, 2021).



Figure 43: The company Swapfiets is offering their clients a Product-Service System and assures them with an always working bike.

### 5.1. Vision statement

Based on the design recommendations, a design vision statement for products made of recycled plastic is formulated to grasp the essential interaction with the products in one sentence. Together with the design recommendations, this statement can be used as inspiration for ideation. Also, it makes it easier to communicate and understand for stakeholders. The design vision statement is presented as follows:

*“Make the benefits of products made of recycled plastic more tangible in a fun, informative experience.”*

The vision statement and the design recommendations will serve as the foundation for the strategic design direction. It will be used as input for the ideation phase.



## 6. IDEATION

The previous chapter discussed the design recommendations for enhancing the consumer acceptance of products made of recycled plastic. The following vision statement was created:

*“Make the benefits of product made of recycled plastic more tangible in a fun, informative experience.”*

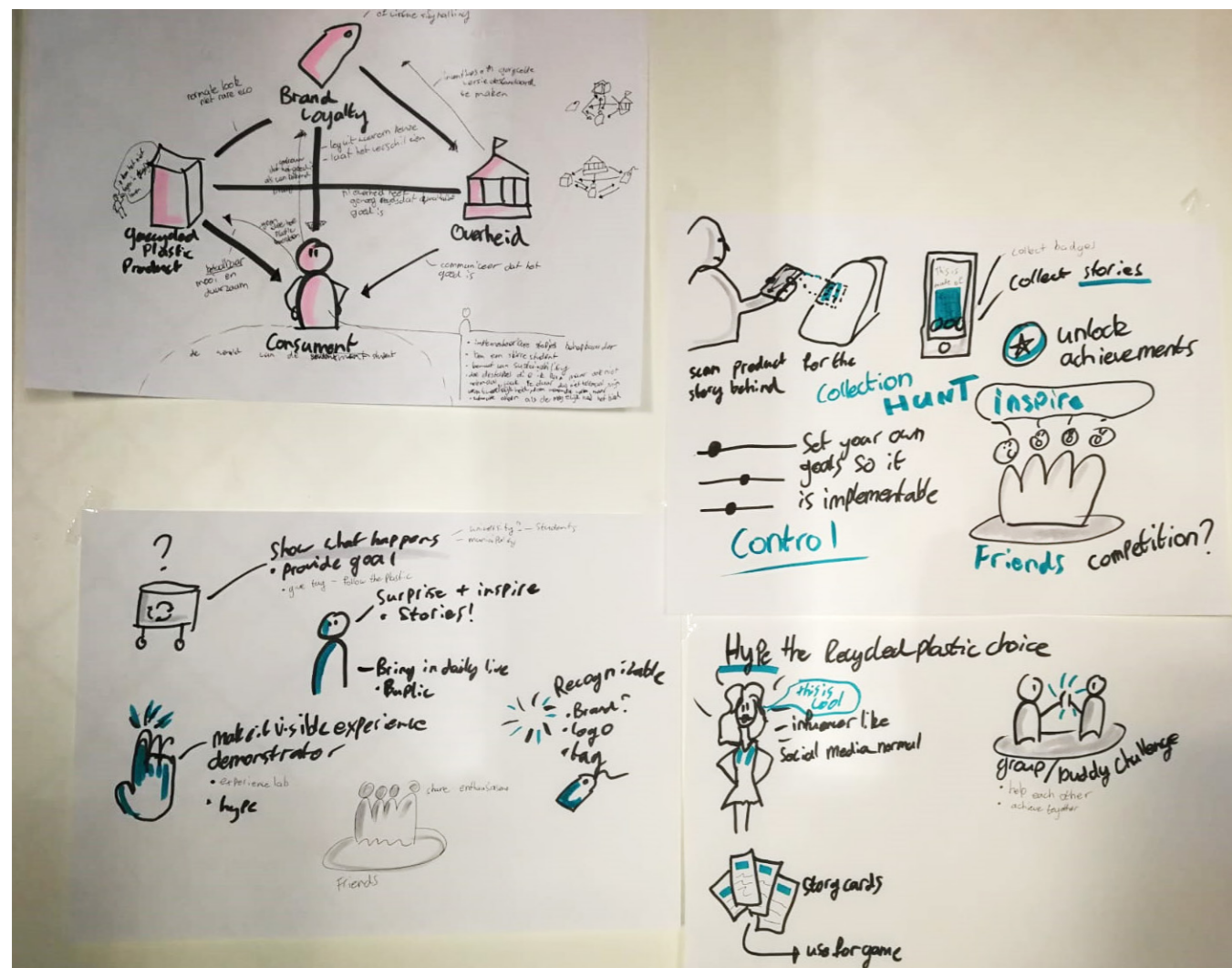
The design recommendations and the vision were taken as a starting point for the ideation sessions. Several brainstorm activities are conducted to generate ideas that meet the design recommendations and align with the vision statement. The initial plan was to have a creative session with a group of people, but another format was chosen due to the restrictions that the Covid-19 pandemic brought. Alternatively, an individual brainstorm session was conducted, and an online one-on-one brainstorm, split into two sessions with a Strategic Product Design student. This chapter presents the idea outcomes of the sessions and the resulting concept ideas.

### 6.1. Individual session

At the start of the individual session, a brain dump on paper was conducted to get any first ideas and thoughts out of my head. A picture of this session can be found in Figure 44.

After the brain dump, the individual session continued with a brainstorm to formulate a list of “How to’s” (H2) questions based on the design recommendations and the vision statement. The goal of this session was to

come up with ideas on how the mentioned design recommendations could be applied. Phrasing the design recommendations in the form of a “how to...?” makes them much more inviting and dynamic, with a specific goal in mind and doing something about it (Tassoul, 2009). It is a great way to generate ideas as it “sounds like an invitation to expand on it with ideas and suggestions.” (Tassoul, 2009, p105). A first round of ideation is done around these H2 questions, as shown in Figure 45.



**Figure 44: Picture of the first brainstorm**



**Figure 45: Impression of H2 brainstorm session based on design criteria (enlarged version can be found in Appendix F: Ideation)**

## 6.2. Duo sessions

After the individual session, a fellow strategic product design student was invited for a joined brainstorm session to stimulate more creative thinking. The online collaboration platform Miro.com is used as a whiteboard, and Zoom was used for live communication for this session. The design recommendations and the vision statement were presented to him as well as the H2 questions. New comments and ideas were added. Subsequently, a brainstorming session was conducted on how to invert the H2 questions to make them worse. This is a good technique to bring another perspective to a problem and spark ideation as people tend to see problems more easily than solutions (DUX, 2011). For example, the H2 question “H2 surprise people?” became “H2 scare people?” and “H2 make it fun?” became “H2 make it boring?” With these inverted H2 questions, a reversed brainstorm was done around them to generate ideas that contributed to making the questions worse. After generating ideas on how to make it worse, another brainstorm is done on how to convert these ideas again to establish the opposite, resulting in many ideas for meeting the design criteria. In Appendix F: Ideation, a screenshot of the Miro board can be found, providing an overview of the reversed brainstorm session and the ideas.

In the next step of the duo session, pictures from the internet were collected. The goal was to create a visual impression with the pictures for the ideas generated in the reversed brainstorm. Besides, drawings were made to add to the visual representation of the ideas. The session was

continued on another day to let the ideas settle a bit.

With a fresh pair of eyes, iterations on the existing ideas were made, and new ideas were added during the second session. Also, a round of brainwriting was conducted (Figure 46).

All the generated ideas of the sessions were clustered, resulting in five cluster ideas. These idea clusters are presented in the following section.



Figure 46: Brainwriting exercise to generate ideas

## 6.3. Idea clusters

As mentioned in the previous section, the generated ideas were clustered. This resulted in five ideas on how to “*make the benefits of products made of recycled plastic more tangible in a fun informative experience*” to enhance consumer acceptance of products made of recycled plastic. These cluster ideas are explained in this section. For each cluster, the advantages, limitations and interesting elements are described. This provides a systemic way of evaluating those early idea clusters (Van Boeijen, Daalhuizen, & Zijlstra, 2020).

### 6.3.1. Simulation with avatar

This idea is based on games in which players can compose their own avatars (see Figure 47). For example, in the game Mario Kart, players can choose different attributes for their racing car. Each attribute has another effect on, for example, the speed, acceleration or weight of the car. These effects are directly visible when changing attributes. A comparable thing can be done by (web) stores and brands. They can present their products with the possibility of changing the attributes, such as the material. The effects of these changes will be immediately visible, and in this way, the consumer is made aware of the direct consequences of their actions. Also, the consumers can compare different combinations of attributes. For example, when the material is changed to recycled plastic, the consumer will see this is less damaging for the environment. Also, providing consumers with the possibility to choose recycled plastic as a material for the product is a way of informing the (unknowing) consumer that recycled plastic is an existing option.

#### Advantages (Plusses)

- Changing the attributes is a playful tool to inform consumers about the differences and the fact that it is possible to produce the product in recycled plastic.
- Consumers get direct feedback of their changes in the attributes, which makes the effects tangible.
- For stores and brands, it is a way to provide their customers with the possibility to personalize their products to make them their own, allowing for self-expression.
- Playing around with the attributes could



Figure 47: Idea cluster 1 - Simulation with avatar

easily be done in an online environment, making it very accessible. It may also be done in a physical store, then it becomes more of an physical experience, but this will be harder.

#### Limitations (Minuses)

- Consumers may find it too time-consuming to compare all the different attributes and the possible combinations. They just want the best product, why not directly provide this to them.
- The too-much-choice effect. Presenting consumers with too many alternatives has a negative effect on the purchase decision. It also decreased the feeling of satisfaction after purchase as the more options the consumer knows of, the more uncertain they are if they made the right choice (Greifeneder, Scheibehenne, & Kleber, 2010). This is, of course, not beneficial for brands and stores. As an alternative, companies may

better present some fixed combinations of the product.

- For companies, this could be very costly in manufacturing all the different combinations of the product. Therefore the number of changes should be limited or offer some fixed combinations.

#### Interesting

- Such a simulation is a fun way to make people aware of their actions and decisions, but still in a safe environment.
- The simulation could also be used as an informational tool that allows for self-expression without necessarily purchasing the product. The creations could be shared with others on social media.
- The possibility to make changes in the attributes could be limited to the material only. In this way, the effects are also extra focussed on the benefits of recycled plastic and better comparable.

### 6.3.2. Experience museum

The source of inspiration for this idea cluster comes from the growing popularity of “Instagram museums” such as WONDR or Moco Museum (see Figure 48). People visit these playgrounds for adults to emerge themselves in the colourful interactive experience the museums provide. Many pictures and selfies are taken and shared on social media platforms such as Instagram, which is great for the museum’s publicity. Such an experience museum could also work for products made of recycled plastic by presenting them to consumers in an immersive interactive way. Part of the exhibition scenery could be made of recycled plastic.

#### Advantages (Plusses)

- These kinds of museums do very well on social media. It is a good example of what people want to share with others and enthrall them to visit the museum.
- The publicity is good for the city the museum is located in, attracting new visitors and tourism.
- It is an immersive environment, triggering fantasy and surprise.
- When people are having fun, they are more open to learn, so it is a good moment to combine this with information about the benefits of recycled plastic.
- It provides opportunities for collaborations with influencers/ celebrities and the museum. The publicity is for both interesting.
- For brands and influencers a way to express their environmental consciousness to the world and competitors.
- Possibility to touch and feel the material

#### Limitations (Minuses)

- One needs to be careful that there are not only “artsy” and extravagant pieces as this may result in people not associating recycled plastic with “normal” products. A combination would be best.
- The experience can be enriched by sharing background stories about the origin of recycled plastic. Otherwise, it may stay superficial.
- It may lead to unnecessary use of a lot of recycled plastic. The pieces should be recyclable after use. They can also maybe be sold or borrowed to other museums as an exposition.

#### Interesting

- A museum could create a competitive reputation by only using recycled plastic in its exhibition and hopefully being an inspiration to other companies.
- It could become a moving exposition, increasing the reach and creating an interesting business model.
- Interesting opportunity for collaborations with influencers, designers and brands.
- Many of these museums started as pop-up museums. This could also be an interesting opportunity as it could be located in a familiar public place.

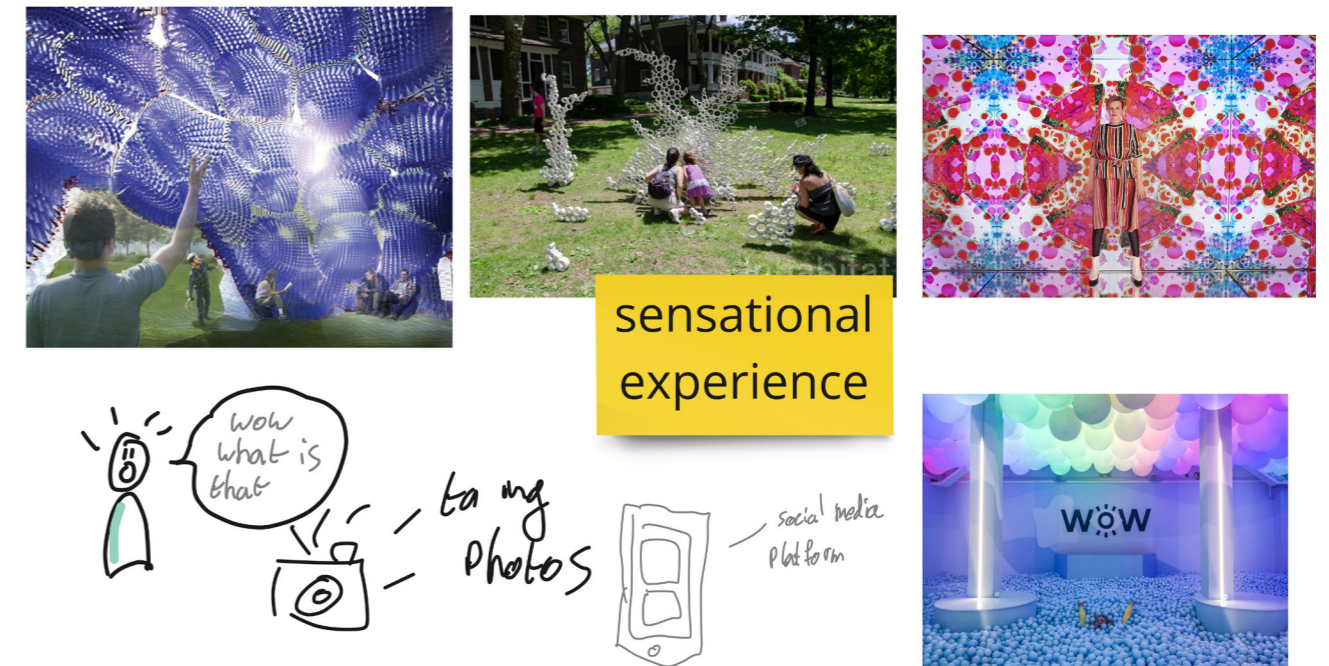


Figure 48: Idea cluster 2 - Experience-museum

### 6.3.3. Treasure hunt in the city

This idea cluster is based on the treasure hunt game children play (see Figure 49). However, not only children play this game. Geocaching, for example, is an outdoor sport and game in which people have to find a cache (treasure) somewhere in the world by using GPS coordinates. Geocaching is practised all over the world. A similar urban-oriented game can be done with products made of recycled plastic. Using GPS coordinates, people can hunt for products and objects made of recycled plastic in the city. Information and a story about the object can be shared with the “hunter” when the product is found.

#### Advantages (Plusses)

- It is a fun activity to do and triggers curiosity and challenge of people to find the objects.
- Nice outdoor activity.
- The objects could be made of local plastic, providing citizens with a better understanding of what happens with their plastic.
- Information can be “hidden” in the hunt. People tend to like stories. Providing the hunter with a story about how much plastic from the city is used to make the object and how much impact this made compared to when the object was made of virgin plastic.
- For a city, this is a good way to guide people to new, unfamiliar places, more like a city tour.
- It could be an opportunity to collaborate with local stores, restaurants or companies, by including a “treasure” that visits their place.

#### Limitations (Minuses)

- Geocaching is more of a secretive activity to do. It is mainly done alone or with one other person. It would be better if this hunt is a more social, sharing thing to do. More like Pokémon go.
- It will only work if there are already recycled plastic products in the city.
- When it is a hidden thing, other people not playing the treasure hunt will not see it.

#### Interesting

- Urban city game to play with friends and family
- It could be a nice walking route along with highlights of the city. This could be provided by, for example, the information centre of the city.
- Good for collaborating with local businesses.
- Locally collected plastic can be used for the products/object



Figure 49: Idea cluster 3 - Treasure hunt in the city

#### 6.3.4. Big expo event

The fourth cluster contains ideas for presenting products made of recycled plastic at a big event or an expo (Figure 50). For example, a parade in which all the vehicles and installations are made of recycled plastic. This is similar to the famous yearly flower parades where everything is made of flowers. It could also be a designated section on, for example, the world expo in which the countries are challenged to make their entry out of recycled plastic. Such an event will attract many visitors from around the world. This makes it attractive for companies to become partners or sponsors ( "powered by..."). The possibilities of what can be created with recycled plastic will be challenged, which can result in interesting, surprising entries.

##### Advantages (Plusses)

- There will be much publicity, creating awareness for recycled plastic in products.
- Interesting for companies to sponsor or partner with the entry of the country.
- The host city will be visited by many visitors from around the world, making it interesting for the city's economy.
- Parades or expos are enjoyable for people. They go there to be entertained.

##### Limitations (Minuses)

- In the case of the World Expo, all the entries of the countries have to be shipped to the host country, which is probably not very environmentally friendly. So maybe it could be a national expo, in which cities are challenged to send in an entry of locally recycled plastic.
- This is the same with parades. The

vehicles used to tow the floats emit a lot of CO<sub>2</sub>, which is not beneficial for the environment. A solution could be that the towing vehicles have to be electric vehicles. However, the energy that is used to power electric vehicles has to be green as well.

- This could lead to an overuse of recycled plastic with the risk that still virgin plastic is needed to make the design. Besides, there needs to be a purpose for the creations after the expo/parade as well (e.g. recycled again, sold); otherwise, it is a waste of the valuable recycled plastic.
- It is tricky to control the production process of all the countries/entries.
- It is probably very costly for companies and manufactures to produce and create such big objects made of recycled plastic.

##### Interesting

- Challenge on the design, pushing the limits. This could be a good way to stimulate the research and investment of new solutions with recycled plastic. Possibility to show off what you can do as a company, such as the architects at the world expos.
- Would get a lot of publicity, so increasing familiarity
- People are likely to share this with others because they are surprised and enthusiastic about what they see.
- Triggering curiosity, surprise and a of fantasy
- Possibility to show off what you can do with recycled plastic as a company, such as the architects at the world expos



Figure 50: Idea cluster 4 - Big expo event/parade

### 6.3.5. Plastic drive-through

This idea is based on an attraction in a theme park or funfair, such as the Fata Morgana in Dutch theme park de Efteling. While seated in a boat on a fixed trail, guests drive through the parkour. During this journey, they are exposed to objects that together form different Arabic scenery. Such a drive through scenery could also be made with products made of recycled plastic. This idea has some similarities with the museum, but here the objects/scenery is presented in a premediated order. This makes it possible to show diorama scenes in a specific order, making it possible to tell a story.

#### Advantages (Plusses)

- It provides the visitors with a fun and surprising experience, triggering fantasy and curiosity.
- It is a way to show that “normal-looking” scenery can be made with recycled plastic.
- While driving through the scenery, a story could be told. This story could have an educational connotation, informing the consumer about products made of recycled plastic and the environmental problems.
- People will likely tell their friends about this experience to also visit the drive-through.

#### Limitations (Minuses)

- A drive through that could only be visited by cars is not really a sustainable solution because of the CO<sub>2</sub> that is emitted. It would be better when the drive-through could only be visited by foot or bike. By the way, the Netherlands is a paradise for bicycles making this an interesting solution.

- There is not really an interaction with the products by the visitors. It would be more interesting if the visitors would have to make certain choices and that these choices affect the story's ending.

#### Interesting

- The dioramas can interactively tell an educational story, showing the visitors the impact of their choices.
- This plastic attraction can be an expansion in an already existing theme park (e.g. the Efteling, Disneyland)



Figure 51: Idea cluster 5 – Plastic drive through



## 7. IMPLEMENTATION: BUSINESS CASE FOR THE MUNICIPALITY OF ALMERE & SAVE PLASTICS

Thus far, the graduation project has focussed on a broader perspective of enhancing the consumer acceptance of products made of recycled plastic. At this point, the project will zoom in on a more specific application of the conducted research, the design recommendations and the ideas. The link will be made to the perspective of the municipality of Almere and Save Plastics, two key partners of the TRANSFORM-CE project. This chapter focuses on how the research insights, design recommendations, and ideas can be translated into new opportunities, providing value for the municipality of Almere and Save Plastics.

## 7.1. TRANSFORM-CE

This graduation project is part of the Interreg North-West Europe TRANSFORM-CE project. The TRANSFORM-CE project wants to bring radical circular change in the recycling of plastics. The aim is to recycle all disposable plastic, also the single-use plastics (e.g. foils, plastic bags) from municipal and commercial waste streams into valuable new products. Besides, TRANSFORM-CE supports businesses to adopt circular business models by offering them a valuable resource as an alternative to virgin plastic. In this way, the project aims to increase the demand and uptake of recycled plastic by businesses. Two pilot plants in Almere and Manchester will show that the recycled plastic from the municipal plastic waste can be re-purposed and revalued. An estimated 2580 tonnes of plastic of these municipalities will be repurposed between 2021 and 2024, leading to an estimated reduction in CO<sub>2</sub> of 2800 tonnes (Interreg North-West Europe TRANSFORM-CE, 2021). That are almost 2000 cars.

The TU Delft is one of the partners of the TRANSFORM-CE project. The focus of the TU Delft is on improving the collection of single-use plastics, identifying and developing 3D-printing applications, and identifying the consumers' perception of products made of recycled plastic to adjust to the needs of the consumers. The latter is the one this graduation project focussed on as well.

The Municipality of Almere is another partner of the TRANSFORM-CE project, and they are one of the key contributors to the project. As mentioned above, a green plastic plant is built in the city of Almere. This was done in collaboration with the company Save Plastics, another partner of the TRANSFORM-CE project. Together they produce products of the difficult to recycle, low-quality plastics (mix plastics) for public space and housing construction. In this way, the production of new virgin plastic is prevented, and the plastic waste is reused/repurposed on a local level, closing the cycle of municipal waste to new products.



Figure 52: From municipal waste plastic to new products for the public space and housing construction (Save Plastics, 2021b).

## 7.2. Evaluation of design ideas

As mentioned in the previous section, this chapter will focus on implementing the design recommendations (chapter 5) for the specific context of the municipality of Almere. An overview was created on how these eight design recommendations would apply to the municipality and their citizens. The design recommendations for the municipality of Almere are presented in below.

### Inform about product (details)

- Inform citizens about the possibilities of recycled plastic and emphasize the durability of the recycled plastic.
- Inform the citizens of what happens with local plastic, explain that it will be repurposed for new products in the cities and be transparent about the production process.
- Inform citizens about the environmental effects/benefits (footprint) for the city of using recycled plastic for products with numbers or graphs.
- Inform how much plastic waste is used in recycling.

### Make it tangible

- Highlight the effects of recycled plastic on a local (municipal) level.
- Provide citizens with a clear goal by explaining that the municipal waste plastic will be repurposed into products.
- Display and depict this goal also on the plastic recycling bins in the city.

### Make it Attractive

- Make the products attractive for citizens by timeless designs for the products in public spaces. Avoid the “eco” look.

- Present the products in an “easy way” to do or to visit.
- Besides highlighting the benefits, make the products made of recycled plastic attractive by positive promotion by including fun, humour or social aspects to elicit positive emotions.

### Make it Fun

- Deliver the information in a fun way to the citizens by presenting it in a story or through an environment that triggers the senses.
- Recycled plastic is innovative; show this and inspire people.
- Trigger the fantasy, curiosity and challenge of the citizens

### Create social influence

- Make it social; people want to share their enthusiasm with others. Provide them with a reason to do so and make it easy for them to share.
- Express enthusiasm about the products made of recycled plastic and share experiences with them as a municipality.
- Stimulate social comparison. Publish facts about the citizens’ purchase or usage behaviour of recycled plastic products (e.g. percentage of how many citizens are taking it into account, or comparing to other municipalities).
- Providing citizens with a challenge they can take together. Stimulate cooperation and competition.

### Stimulate try-out

- Provide citizens with the opportunity to feel and judge the products for themselves by including products made of recycled plastic in a public place, open for everyone to try.
- Provide citizens with free samples. This

could be done in collaboration with brands or local businesses.

### Stimulate familiarity

- Increase awareness by a campaign of the municipality to take away misconceptions and publicly supporting products made of recycled plastic.
- Increase familiarity by exploiting a well-known brand name or by the influence of famous people (for example, linking a brand or celebrity to the awareness campaign).
- Make the products accessible by providing familiar public places for recycled plastic products and by using recycled plastic in future (construction) projects (e.g. libraries, train stations).
- Show the possible applications of recycled plastic in the municipality

### Build Trust

- Stimulate businesses with incentives to use recycled plastic and show that the proper measurements are taken.
- The municipality of Almere needs to endorse products made of recycled plastic, emphasizing the quality and safety of the products to take away misconceptions people have (this could be done, for example, in a campaign, as discussed before).
- As a municipality, it is hard to provide warranties or money-back guarantees, but they can highlight the lifetime guarantee given by the company Save Plastics for their products when discussing future (construction) projects in the municipality.
- Collaborating with a major brand can strengthen the trust in recycled plastic products, as endorsements by authorities and well-known brands are

both enhancers of trust and an indicator of good qualities.

- The same applies to a well-known store image. The municipality can collaborate with a local store with a good reputation among the citizens of Almere.

Explanation C-box

Based on the recommendations more specified for the municipality of Almere, the idea clusters were re-evaluated. In this evaluation, the ideas were assessed based on the C-Box method (Tassoul, M, 2009). By using this method, the ideas were mapped on a matrix with innovativeness and feasibility as parameters. It also provides insight into which ideas are more for the short term and which ones are more long-term. By executing the evaluation with the C-Box, the ideas were divided over four quadrants:

- 1. Non-starter ideas. These ideas are very hard to implement and are not really new or original.
- 2. Ideas that can be executed now. These ideas are easy to implement, with low risk involved. They can be made a little bit more exciting, though, and have the potential becoming ideas of quadrant 3.
- 3. Ideas that are very exciting. These ideas are very innovative and could be implemented.
- 4. Ideas for the future. The ideas are very exciting but more challenging to implement. These ideas have the possibility to become ideas of quadrant 3.

It is important to keep in mind that this evaluation is done from a perspective of how feasible and innovative this is for a municipality. This C-box can be found in Figure 53

As can be seen from the C-Box, there are not yet ideas in quadrant number 3. Therefore it is investigated how to make the ideas easier to implement or more original/ exciting. Looking at the ideas, the treasure

hunt in the city and the experience museum have the highest potential to become an exciting number 3 idea. These ideas provide short-term implementation opportunities and more long-term opportunities. Besides, with some changes, the other three ideas could be considered as an addition or future implementation in the treasure hunt or experience museum. The ideas of the treasure hunt and experience museum are taken for iteration, resulting in two possible concepts for the municipality of Almere.

Looking at the idea of the simulation avatar from a municipal perspective, this may not be very feasible. Playing around with the attributes and comparing the different effects is less of a thing to do in a public area but more in an online environment or in a physical store. However, it could be an interesting addition to the experience museum, in which visitors can change attributes and “experience” the changes in effect in a more physical sense. This would be a fun activity to do for visitors.

The idea of an experience museum made of only recycled plastic is a bit more challenging to implement as this has not been done before. However, it is less of a risk as a big expo event, and it meets most of the design recommendations. Besides, an experience museum is an innovative way to show off the capabilities of repurposing municipal plastic waste streams. Also, it has the potential to reach a broad audience through social media. The experience museum could start small with a small exposition or a few experience rooms to make it easier to implement and expand when the possibility is there.

A treasure hunt in the city could relatively

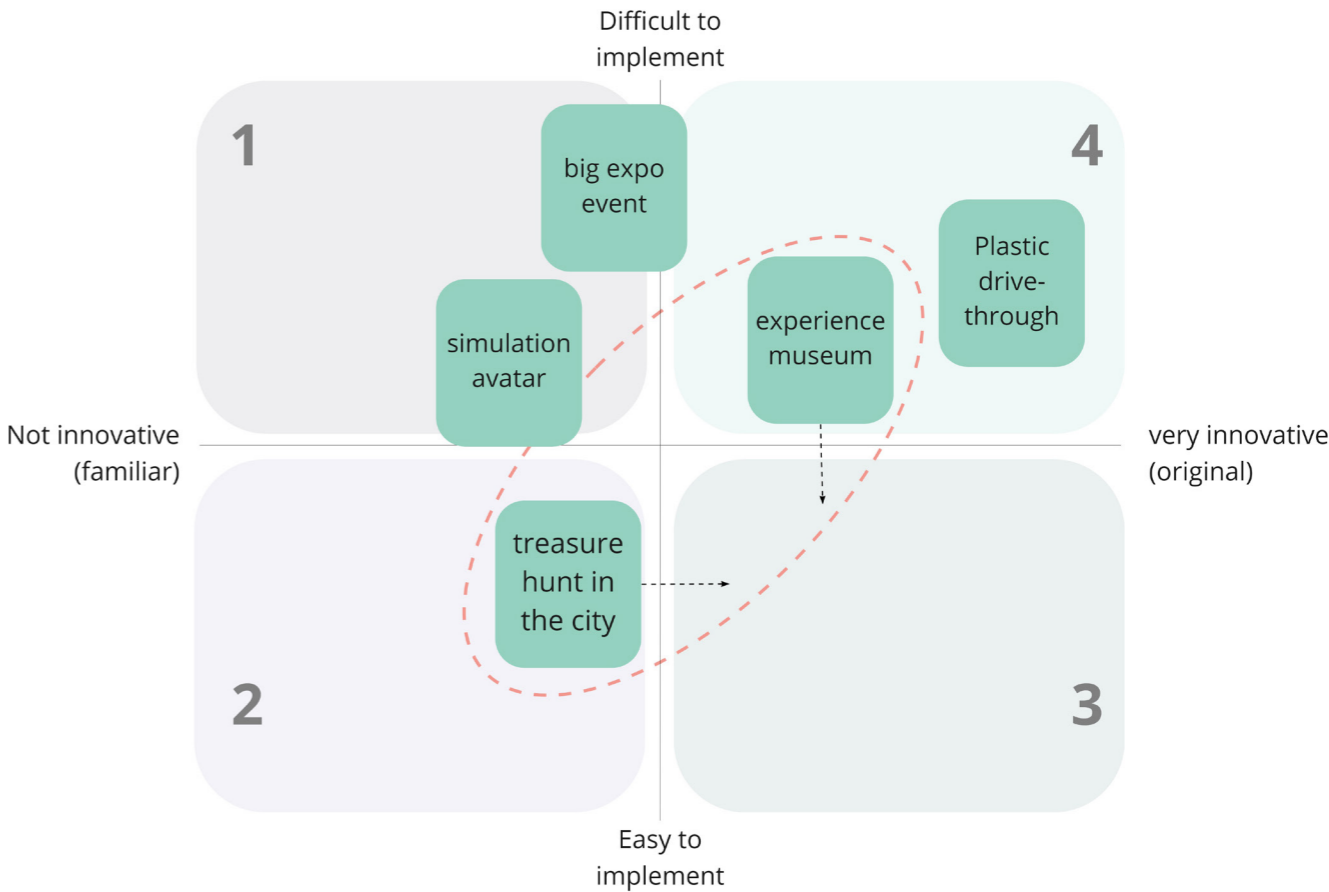


Figure 53: C-box evaluation of design ideas from a municipality perspective

be implemented in the short term by a municipality as most municipalities are familiar with walking routes in the city. However, for this walking route, the municipality has to know where recycled plastic products are located in the city, and therefore it is a bit more challenging to implement. Besides, this idea could be easily scaled to other cities or implemented on events or expositions.

A big expo event is a more familiar thing to host for a municipality, but it is also ambitious to execute. A big exposition event requires a lot of time and planning and brings a lot of financial risks for

the municipality. It would be better to investigate the possibilities to connect to an existing exposition.

The idea of a plastic drive-through is challenging to implement and a very new thing for a municipality. However, a drive-through does not allow people to touch and feel the products made of recycled plastic themselves, and a drive-through with cars does not match the sustainable image of the recycled plastic. Changing it into a walking drive-through would be better. In doing so, the idea becomes almost similar to the experience museum.

7.3. possible concepts for the municipality of Almere

Resulting from the C-Box evaluation, the treasure hunt and the experience museum ideas were taken for further iteration. This section explains the two possible concepts resulting from the iteration. The concepts were proposed to the municipality of Almere and discussed to identify how to create the most value for the involved parties. First, the design recommendations were presented, followed by the two concepts. The concepts were explained separately, but it was mentioned that they have the potential to be combined, being an addition to each other.

The plastic route

The municipality of Almere has created several walking routes through interesting places in their city, for example, the architecture route (Figure 54) or the nature route. Those routes are available on the website of Almere and at the tourist office. A plastic route along products made of recycled plastic located in the city of Almere could be added to the already existing city walks. This could be made more exciting by including story cards and questions, making it more of a treasure hunt or quest for the products. With the questions and story cards, information about the locations and products is provided in a more fun way. The plastic route also supports local businesses that already use recycled plastic by including them in the route. They could be an example for other businesses, motivating them also to use recycled plastic. This route provides the citizens of Almere with more insights into the repurposing of their municipal plastic waste. The municipality of Almere already has the resources and

capabilities with their plant to provide new products to the citizens of Almere with the plastic waste of the citizens, but they have to show this and express their trust in the products by appreciating them in a route. Figure 55 provides an impression of such a route for the city of Almere.

Pop-up experience information centre

In a familiar place in Almere, a pop-up experience information centre could be created. This was inspired by the pop-up Instagram museums that are popular right now. The municipality of Almere can showcase and demonstrate the products they make of municipal plastic waste, increasing familiarity and awareness. Visitors could experience the benefits and quality of the recycled plastic products themselves while emerging themselves in the interior and setting, triggering curiosity and fantasy. Information about the products and plastic pollution can be displayed next to the products and interior pieces. It is interesting to collaborate with local brands and businesses by providing them the opportunity to showcase their products or by designing part of the collection. Besides, a photogenic experience centre is often shared by people on social media (as can be learned from the Instagram museums), providing the municipality of Almere with an opportunity to collaborate with influencers or famous people, expanding their reach. The pop-up experience centre has the potential to expand when it is a success. It could even result in a non-temporary centre in the city of Almere. An impression of the pop-up experience information centre is presented in Figure 56.



Figure 54: Screenshot the website of Almere of the architecture walk



Figure 55: Impression of plastic route

The concepts can be implemented separately, but it would be more interesting to implement both ideas extending each other. This could be done, for example, by including the experience centre alongside the plastic route. The experience centre could be the finish point of the plastic route as the icing on the cake. Another option is that the experience centre is also included in the plastic route, but the location changes. Another location could mean a new pop-up experience, triggering the curiosity of citizens. As the “collection” of the centre is temporal, a feeling of urgency to visit the centre is created, keeping the experience centre interesting. Another alternative is that one of the local businesses participating in the plastic route hosts the pop-up experience information centre. When a new business joins the plastic route, a new experience can be popped-up in this new business, creating extra exposure for the business and creating a new experience for the visitors.

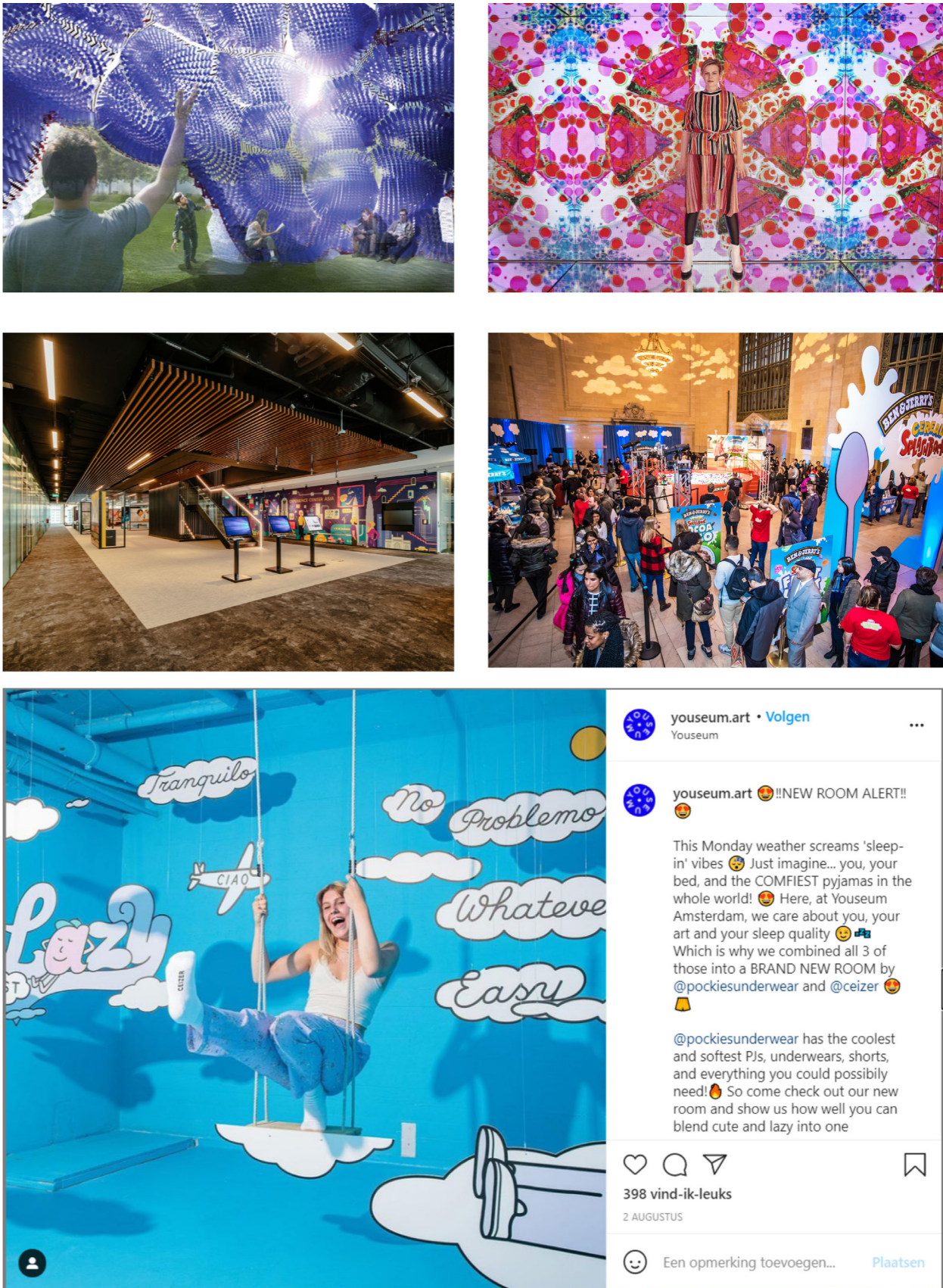


Figure 56: Impression of the pop-up experience information centre

## 7.4. Evaluation of concepts

During the meeting with the contact person of the municipality of Almere, the design recommendations and the concept ideas were presented. Besides, the role of the municipality was discussed. This meeting provided insights and input on how this graduation project can be of importance for the municipality of Almere and Save Plastics and the future of the green plastic plant. The essential insights of the meeting are summarized below:

- The amount of plastic that ended up being incinerated after being sorted was undesirable. Therefore, the municipality of Almere searched for a more circular waste stream for the low-quality mix plastic waste. They opened a challenged and came in contact with Save Plastics. They applied for funding, resulting in the TRANSFORM-CE project with multiple partners. With the funding, it was possible to build the plastic plant.
- The municipality of Almere made a deal with SavePlastics that if they can manufacture good products made of municipal waste plastic, the municipality will purchase those goods. A win-win situation and a circular way of managing waste streams.
- In the past years, the municipality and Save Plastics experienced a lot of resistance by companies to purchase and use the recycled plastic material, as they did not believe it is a good alternative for hard wood and did not feel the urgency to change their materials. Therefore, the municipality of Almere and Save Plastic invested much time in obtaining the proper certifications and quality marks, proving

that the quality of the recycled plastic material was good and safe.

- Now it is time to spread the story and the message of the plastic plant and the circular business model of making plastic products of the waste plastic. The municipality of Almere and Safe Plastics have the resources, knowledge and expertise in hand, but they lack the expertise on how to spread the story and reach consumers. They affirmed the importance to make the benefits of recycled plastic tangible for people and show them the possibilities of recycled plastic and take away any misconceptions about recycled plastic.
- The municipality of Almere expressed enthusiasm about the concepts of a walking route and experience centre as an application/execution of the design recommendations. They saw potential in a combination of the experience centre and the walking routes.
- In 2022, Almere will host the Floriade. The Floriade is the worldwide horticulture exhibition and is held every ten years. At this Floriade, a demo of the “Save-Tasta home”, a tiny house made of recycled plastic, will be exhibited by Save Plastics to let visitors experience and show the possibilities of recycled mix plastic (see Figure 57). This is already a great step in executing the design recommendations of this project. Besides, there will be a “green route/road” directing towards the Floriade. During the meeting with the Municipality, it was discussed that this would be a fitting route to include the products made of recycled plastic as there are already entertaining things to see.



Figure 57: The Save Tasta Home that will be built on the Floriade Expo 2022 (Save Plastics, 2021c).



Figure 58: Example of a green plant wall ([Groene Planten Wand]), n.d.)

- When discussing the concept of the experience centre, it was told that the municipality has a small moveable upcycle centre which they use at schools. Besides, there is a small plastic “factory” where people can bring their own plastic waste and transform it into a frisbee they can take home. Such activity will perfectly fit in the experience centre. It was nice to see the enthusiasm of the contact person when sparring about what could be made of recycled plastic to create a fun experience. Besides civil engineering, they are innovating a lot in building elements that would fit great in the experience centre. One of those building elements that were discussed, for example, was a green wall totally covered with plants (see Figure 58).
- An experience centre inspired by the popular Instagram museums that do very well on social media these days appealed to the municipality. Especially exposure through social media suited their interest as this is a new market for them. They saw the potential of reaching many people through social media and linking an ambassador to the products made of recycled plastic. As this is a new field for them as a municipality, they also think it is challenging to find a celebrity or popular person that wants to represent the products and the experience centre.
- They are working on some sort of heritage program. What will remain after the Floriade Expo 2022 has come to an end. The concepts presented could be part of this and scaled to meet the municipality’s ambition and Save Plastics to spread their story to other cities as well.



## 8. ROADMAP TO THE FUTURE

After the meeting with the municipality of Almere, a final iteration on the concepts was made, including the input and insight of the municipality of Almere. This resulted in the final strategy for increasing consumers' acceptance of products made of recycled plastic, applied to the situation of the municipality of Almere and Save Plastics. This final strategy includes a combination of the design recommendations to overcome the identified barriers. For the execution of the final strategy, it is necessary to provide the municipality of Almere and Save Plastics with guidance. A roadmap was made to make the strategy more clear and tangible and ensure it is actionable. It is "a visual portray of design innovation elements plotted on a timeline" (Simonse, 2017, p.10). These elements can include products and services, user values, markets and technology applications. Therefore, a roadmap is a valuable deliverable for this graduation project as it provides the municipality of Almere and Save Plastics with a (visual) process towards the acceptance of products made of recycled and their business of transforming waste plastic into valuable products. Over three horizons, the road to the desired future is described. This roadmap is the outcome of the extensive research of this graduation project, combining all the insights of the pressure cooker, literature review, qualitative user study, and insights from ideation and evaluation with the municipality of Almere. It shows a designer's perspective on how to contribute to enhancing consumers' acceptance of products made of recycled plastic.

## 8.1. Future vision statement

The creation of a roadmap starts with formulating a future vision statement, describing where a company or organization wants to be in the future. The future vision statement for the roadmap of the municipality of Almere and Save Plastics derives from the vision statement of chapter 5 and the design recommendations and insights of the evaluation of concepts described in chapter 7. The future vision statement is as follows:

*“The municipality of Almere and Save Plastics will be leaders/frontrunners (in the Netherlands) in the transition to a circular plastic waste stream of repurposing local plastic waste into new valuable products; Through community building, the acceptance of products made of recycled plastic is enhanced, ensuring sustainable consumption and production of plastic.*

This leader position radiates the wish of the municipality of Almere and Save Plastics to spread their story of the circular plastic plant and share their knowledge and expertise with other cities. They are living proof that it is feasible to transform waste plastic into valuable, sustainable products. As a strong example, they will form an inspiration for other municipalities and organizations to take action and make the transition into circular plastic waste streams. In order to obtain this leader position, the mission statement of the municipality of Almere and Save Plastics can be described as:

*“making benefits of products made of recycled plastic tangible in a fun, informative experience to the broader public, making recycled plastic the standard norm.”*

As can be seen from this mission statement, it is almost similar to the vision statement of chapter 5. This can be explained by the fact that the design recommendations remain the core values in achieving the future vision, and therefore it is essential to integrate them into the mission statement.

## 8.2. Roadmap set-up

Over three horizons of one, two and five years, the roadmap will depict the strategy of how the municipality of Almere and Save Plastics will reach the future vision. The first horizon will highlight the strategy until October 2022, the second until 2023 and the third horizon until 2026. The time pacing of the horizons is based on the current situation of the municipality of Almere and Save Plastics. This can be different for every roadmap since it is based on the specific situation of a company/organization. In 2022, the Floriade Expo will be opening its doors in Almere. The first horizon will be attuned to this event by opening/launching the green strip towards the Floriade. The second horizon will be focussing on the year after the Floriade, using the heritage program as a bridging step towards launching the pop-up experience museum. In the following years, the focus will be on building a supportive community and scaling up to other cities, spreading the story, growing into the expert leader status. More time will be allotted for this, as building a strong image requires time. According to Cognite Marketing (2019), it takes approximately five years to develop a successful brand from the start. This also includes the development phase, usually taking around two years. This phase is already undertaken by Save Plastics and the municipality of Almere. However, based on the resistance they encountered in the past in gaining the trust and convincing companies and organizations of the recycled plastic as a valid alternative, four years from the Floriade are chosen for developing the strong leadership position. Furthermore, with this time pacing strategy, the future vision will be reached by the

end of 2026, contributing to the deadline of the Sustainable Development Goals in 2030, leaving some room for unforeseen circumstances or events.

For each horizon of the roadmap, the following elements will be included:

1. The goal: This explains the strategy/ focus of the horizon.
2. The products: This shows the products that will be developed and how they evolve in the horizons.
3. The marketing: This explains what marketing steps need to be taken to launch the product.
4. Resources: This explains what (additional) resources are needed.

### 8.3. Horizon 1: The green strip

#### 8.3.1. Goal

The goal of the first horizon will be to stimulate familiarity with products made of recycled plastic and create awareness/informing about the possibilities among the citizens of Almere. This is done in an informal way, in the form of an urban-oriented city game: the Plastic Quest. By opening the first plastic quest for the Green Strip, the route towards the Floriade Expo 2022, excitement for the Floriade Expo 2022 is created. Besides, the citizens are informed about the repurposing of locally collected waste plastic into products for the public space. This horizon will also be the start of creating the strong brand image

#### 8.3.2. Product

##### What?

As an addition to the existing walking routes, the municipality of Almere will start with the launch of the Plastic Quest. This route is in the form of a treasure hunt through the city of Almere, in which the participants/visitors have to hunt/find the right place or product. These products or places are made of recycled plastic, produced by Save Plastics and the municipality of Almere with the municipal waste or revolve around this theme. The first Plastic Quest that will be launched is located on the Green Strip (de Groene Loper). This route will be the main path towards the Floriade Expo 2022. This route already contains some entertaining products made of recycled plastic. Therefore, this is an excellent route to start with, as it can quickly be transformed into a Plastic Quest. By creating a fun learning

environment, the quest will function as a tool to activate the interest and curiosity of the visitors in learning more about recycled plastic as a valuable material for products

Local entrepreneurs and businesses that use recycled plastic will be involved and included in the Plastic Quest. By doing so, the municipality motivates other businesses to purchase products made of recycled plastic as well.

#### *The Plastic Quest*

With the Plastic Quest, the idea is to find different locations/objects in the cities, which are indicated using the GPS connection on peoples phones. These locations can be found on a map in a web application. A web application is chosen, so no additional app has to be downloaded by people to keep the threshold low.

People have to puzzle how they go from one location to the other, triggering challenge, to motivate people intrinsically. Using a distance tracker, they can see if they walk in the right direction; When the distance increases, they go wrong, and when it decreases, they go in the right direction.

When the right location is discovered, a recognizable sign with a QR code will be seen. This signpost will also be made of recycled plastic. The participants have to scan this and will be provided with some information about the location/object. The information will tell interesting (historical) facts and notes about the site in the form of a story and also include informative details about how much plastic of the municipality is used to produce the product, how much emission is saved and what this means for the municipality of Almere.

At the location, the participants will also get a question. This can be a multiple-choice question or a more active search question in which the participants can find the correct answer by searching in the area of the location. With each question, the participants can receive points for the correct answer, resulting in a final score.

The Plastic Quest can be played with multiple people, and multiple teams can be made to compete with each other. Within the team, one has to cooperate to beat the other team(s). The team with the highest score wins. When not playing against another team, they compete in the overall high score, playing against teams that previously participated in the Plastic Quest.

For the Plastic Quest: Green Strip, the finish will be on the Floriade Expo 2022. For other future Plastic Quests, the finish could be somewhere in the city centre. Locations to relax and chat after the game route will be suggested as the finish in the app. These suggestions will consist of the local businesses, such as cafés or restaurants affiliated with the Plastic Quest.



### 8.3.3. Marketing

In order to make the Green Strip and the following Plastic Quests a success, marketing is an important aspect. A municipal marketing campaign is needed to increase the awareness and the excitement for the Green Strip and other following routes and thus products made of recycled plastic. As the Floriade Expo 2022 will be promoted heavily, it is better to frame the promotion of the Green Strip Plastic Quest as part of the Floriade, to prevent an overload of information. The marketing campaign consists of offline and online promotion. For example, advertisements at bus stops and on billboards in the city or at the VVV (tourist information office). Also, it is essential to provide visual information about what will happen with the collected waste plastic of the municipality on the plastic recycling bin, providing citizens with a clear, tangible goal (see chapter 5); That the plastic will be used to make products for public places in Almere, by Almere.

The marketing campaign should be offline and online to extend the reach (especially to the younger generations). Online promotion on the social media channels of the municipality of Almere and Save Plastic is important as social media will form a strong foundation for reaching the future vision (community building).

Besides, connecting with local businesses contributes to promoting the Green Strip (and future quests), as they have their own network. It is important to make sure the joining businesses share and promote the Plastic Quest: the Green Strip as well, online and offline, to enhance the reach.

As the municipality of Almere indicated that

the online social environment is relatively unknown territory for them, more details on what to post on their social media accounts is provided. The launch is divided into three phases: Pre-Green Strip, Green Strip and post-Green Strip. The two main social media channels that will be used are Facebook and Instagram. More about these channels is explained in the resource section of this horizon.

#### Pre-Green Strip

- Before the Green Strip is launched (and in the future other Plastic Quests), provide people with small teasers of the products. Show previews of the products made of recycled plastic that can be found on the Green Strip or post example questions of the game, with the note that the answer can be found when participating in the Quest.
- Share behind-the-scenes content in stories; this will stimulate a more personal connection and create excitement for the opening.
- Brand every post with a hashtag and use this in all future promotions. This hashtag should be aligned and fit with the other two horizons as well.
- Preview the collaborating cafés, restaurants and other local businesses.
- Create a Facebook event for the opening of the Green Strip. This allows to invite people to the opening and provides an indication of how many people will attend.
- It is crucial to keep in mind that the posts on the social media channels need to be aesthetically pleasing and not just dry information. The information and awareness have to be brought in a fun, surprising way.

#### During Green Strip

- Organize an opening activity for the Green Strip to create a festive feeling and to make people excited. Make sure to provide the date, location, time etc., of the opening so people can attend.
- The opening is a great opportunity for a first collaboration with celebrities. A local celebrity could open the Green Strip to increase the publicity and stimulate people to come to the opening. This could be the start of celebrity/influencer engagement in the endorsement of the products made of recycled plastic.
- During the Green Strip (and Floriade), it is important to maintain a high presence on the social media channels. Share real-time content of what is going on at the opening and in the Green Strip Quest in the stories. In this way, you make people more curious and give them the feeling they are missing something fun.
- Share and repost pictures of people and teams that completed Plastic Quest: the Green Strip
- Make the starting point of the Green Strip route highly visible. This will assure that the Green Strip also catches the attention of the people that are not aware of the urban game route and encourage them to participate.
- In order to ensure sufficient turn-out, it is important to provide people with incentives to come and participate in the Green Strip Game. Think of a give-away of products sponsored by the participating businesses on social media or vouchers for a drink for the first 100 attendees or participants of the Green Strip Quest/opening.

#### Post-Green Strip

- When the Floriade Expo 2022 is over, some plastic products included in the Green Strip probably disappear as well. It is important to keep on building on the (brand) awareness of Save Plastics by sharing content that is created by participants. By sharing memories with the followers, the engagement is kept.
- When the Green Strip is gone, a new Plastic Quest along the products that remain and new products will be created. It is important to evaluate the Green Strip Quest, and if needed to implement improvements. Provide the people with previews to create excitement for the upcoming Plastic Quests. Besides, new joining businesses can be shown with a small introduction, creating exposure for them.
- The Green Strip Quest can be used as an example in the negation as a pilot proof of concept to attract celebrities or ambassadors.

The post-Green Strip phase overlaps with the first phase of Horizon 2, as this is also the time to start sharing teasers about the museum.

### 8.3.4. Resources needed

To realize this horizon, the municipality of Almere and Save Plastics need more resources. Active social media accounts are essential to extend reach to a broad public. Facebook and Instagram are both suitable channels to share content. Facebook is the most used channel widely and allows to create events and share videos, photos, comments and text. Instagram is a highly visual sharing platform. Almost one-third of the internet users have an Instagram account. The photo's and stories that are

shared on Instagram have a vital function in the creation of brand awareness and profiling of a brand (Pijs, n.d.), which is essential for Save Plastics and the Municipality of Almere in the acceptance of products made of recycled plastic ( see chapter 5). Both platforms are used by the younger users of 18-29 years old, appealing to Millennials or Generation Z. Besides, older generations also use Facebook (Sheehan, 2019). In this horizon, the focus will be on creating more (brand) awareness for the products made by Save Plastics in combination with the endorsement of the municipality of Almere. Both have an Instagram and Facebook account. The municipality of Almere has a more formal account that is more informative about civil affairs. Besides, they have a “visit Almere” account, which is a bit more informal, sharing touristic information and new fun updates or highlights to visit in Almere. This account will be suitable for sharing content about products made of recycled plastic. It is suggested that both the municipality of Almere and Save Plastics dedicate an employee with an affinity for social media to create the right content and branding. When they do not have the right in-house employee, it is suggested to hire a social media expert that can support in creating the proper branding and content.

Besides, it is necessary to have an overview of the existing products made of recycled plastic so that the Green Strip Plastic Quest can be made alongside the products. Also, interesting questions about the products and locations have to be made for the game, plus the web application to play the game. When an employee cannot do this internally, it should be considered to hire an external party. As international people will

also visit the Floriade Expo 2022, it is highly recommended to release an English version of the urban game route for more inclusion.

It is essential that the municipality of Almere and Save Plastics work closely together and align their content to achieve the needed synergy. The municipality has to express her trust in the products made of recycled plastic produced by Save Plastics, working towards a good reputation of Save Plastics.

## 8.4. Horizon 2: Pop-up experience museum

### 8.4.1. Goal

After the Floriade Expo 2022, parts of the Green Strip probably disappear. The Plastic Quest will be updated by adding new locations to the remaining locations of the Green Strip. Also, new participating businesses will be added as a location to the quest. When there is a high interest, it could be considered to make multiple Plastic Quests in the city of Almere. Updating the routes and adding new routes to the existing ones also helps to keep them interesting for people, triggering curiosity. To stimulate visits to the pop-up experience museum, it could be the finish or the starting point of the new Plastic Quest.

In this horizon, a new element will be integrated into the route of the Plastic Quest. An experience centre will be opened in the form of a pop-up museum. This pop-up museum will expose products made of recycled plastic in a way that is inspired by the heavily shared museums on social media, such as Moco or WONDR Experience, but also Nemo Science Museum, in which visitors can experiment with products themselves, stimulating the senses.

### Pop-up museum

The pop-up museum is an experience centre where visitors can immerse themselves in an expressive room with expressive decoration and scenery for a small fee. In line with the popular Instagram museums, this pop-up museum will be colourful and artistic. The design of the room(s) should consist of highly sharable content to encourage the sharing of visitors on their socials and

stimulate word-of-mouth promotion. The unique point of this pop-up museum is that the decorations, scenery and products are made of recycled plastic of the municipality of Almere, making it an environmental friendly exposition. Besides, the scenery can be recycled again and transformed into new parts for the museum or other products, making it circular.

It is essential that, besides providing the visitors with a fun experience in which they can judge the quality and the application uses of the products made of recycled plastic for themselves, they are also educated and informed about the effects of plastic pollution. The rooms should be designed to show the visitors the problems of single-use plastics and envision how recycling these plastics can change the world, encouraging them to take action. It should be emphasized how much waste plastic of the municipality is used for the pieces and products of the pop-up museum and how much emission was saved by using recycled plastic instead of virgin plastic, to make people aware of the importance of transitioning to recycled plastic as standard material. The already existing mobile upcycle centre of the municipality of Almere will be a valuable addition to the museum as it provides the nice and fun activity of transforming visitors own plastic waste into a frisbee that they can bring home. This is in line with the design recommendations as it makes it very tangible that waste plastic is very appropriate to create new products. However, it should be considered to add other products as well, as a frisbee probably ends up in the closet after using once, which is not very in line with the circular idea. Products to consider could be coasters, a cutting board or a laptop stand, as these are

products used daily.

The idea is to start small, with one or two different themed “rooms” that seem to “pop up” on location in the city of Almere. For this location, it should be tried to collaborate with one of the businesses that are part of the Plastic Quest for better integration of the two. Making a local business the host location (Figure 59) of the pop-up museum is beneficial for them, as it reassures them of extra publicity beyond their own network, probably resulting in extra visitors and sales. This reassurance makes it also attractive for other businesses to join. As was discussed in chapter 5, a store or local business with a good reputation could enhance the trust in products made of recycled plastic and the brands being sold. For Save Plastics, the pop-up museum can be a sort of showroom to other companies, showcasing their capabilities to the rest of the world. When no business addresses they want to be a host, the municipality has to pick/provide a location in the city for themselves, such as the train station or a busy square.

For the design of the pop-up museum, unique features should be included. For example, different kinds of fun visual walls can function as a nice background for photos (such as the plant wall mentioned in the meeting with the municipality of Almere). Such a wall is relatively simple to set up at a location, and some businesses already even have such a wall made of recycled plastic. Besides the design of the walls, the floors could also be used to transform the room into a cool place.



Figure 59: Example of how a host location could be transformed into a pop-up museum

#### 8.4.2. Marketing

The timing for the marketing of the new Plastic Quest(s) and the pop-up experience museum is after the Floriade Expo 2022. They could become part of the heritage program of the Floriade, as was mentioned in the meeting with the municipality of Almere. The heritage programme is meant to keep the vibe of the Floriade Expo 2022 alive, and the launch of the new Plastic Quest and the integrated pop-up museum can contribute to continuing this vibe.

The word “museum” was chosen as this suggest that some culture and education is involved and that it is not just about taking nice pictures. This fits the goal of the pop-up experience museum as it also tries to teach and educate visitors something about the environmental problems around plastic and the possibilities that recycled plastic products offer.

In all promotions for the museum, it is essential to include Save Plastics, for example, with their logo or with a reference, to create brand familiarity for Save Plastics. Besides, the municipality of Almere should

be included in the promotion as well for endorsement of the products made of recycled plastic, as was discussed before.

Also, for the pop-up experience museum, the aim is to collaborate with influencers for extra endorsement of the products made of recycled plastic, working towards ambassadorship for the movement in making recycled plastic the standard norm. In the marketing, it is important to stress that the museum has a low carbon footprint and applies sustainable solutions for the construction and production of the experience. There is a high chance that some sort of collaboration will work out, as the pop-up museum is in line with the sprouting popular Instagram museums. Therefore it is really important to create environments to capture “Instagramable” moments.

Again, the promotion should consist of offline and online promotion, including advertisements at bus stops and banners on billboards, as mentioned in horizon 1. However, one could say that the pop-up experience centre could be seen as one

big physical offline promotion centre for recycled plastic.

Just as for the launch of the Green-Strip, the steps for the launch of the pop-up museums and the new Plastic Quest on social media are explained in three phases: Pre-Pop-up museum, during pop-up museum and post-pop-up museum. There will be some overlap with the marketing of horizon 1.

#### Pre-pop-up

- Provide sneak peeks of the new locations and businesses that will be added to the urban game route after the Floriade Expo 2022 is finished to create new excitement and curiosity.
- Also, announce that a new experience is coming soon to the city to hype and tease the opening of the pop-up experience museum. Share behind the scene content of the preparations.
- To stimulate the hype, approach (local) influencers or other local celebrities such as musicians or tv personalities for a partnership. They can help to expand the reach on social media by some sort of online word-of-mouth. In chapter 5, it was discussed that when there is a good congruence in co-branding, this will enhance the transfer of trust from the well-known brand to the lesser-known brand. It is assumed that this also applies to collaborating with celebrities. The celebrity has to match with the ideals of the pop-up museum for good congruence and transfer of trust in the products made of recycled plastic to the followers of the celebrity.
- Use the same branding identity and hashtag that was created and used for promotion in horizon 1 to create unity

and continuity. In this way, it is also possible to track the popularity of the hashtag and what is being said about the Plastic Quest and pop-up experience museum.

- For this horizon, create a Facebook event for the opening of the pop-up experience museum. This makes it convenient to invite people and to keep an eye on the attendance list. When it seems that there will be a low attendance, incentives to stimulate attendance should be taken. This could be, for example, providing free entrance to the pop-up museum for the first 100 people or including a free gift for the first amount of visitors.

#### During Pop-up

- Make the pop-up experience museum's opening a festive event and share real-time content of the opening in the Instagram and Facebook stories. Be clear about the date, time and location of the opening, so people are able to find it.
- As a side note, the focus of this horizon will be on the pop-up museum. Therefore it is chosen to not organize a separate opening activity for the new Plastic Quest but to integrate this into the opening of the pop-up museum. The opening of the museums also means the opening of the new updated Plastic. This will create both an indoor and outdoor experience.
- For the opening, lure visitors by engaging a celebrity/influencer(s) to open the pop-up museum and Plastic Quest. Whenever a collaboration with a celebrity/influencer was not established, it is even more critical that the pop-up museum consists of highly

Instagramable content to ensure that people start sharing pictures and their experience in the pop-up museum and Plastic Quest on social media. This is important as people rely on the positive experiences of others (as discussed in chapter 5). Extra stimulation of this share factor can be done by creating incentives for people to share pictures of the museum on social media, such as a give-away.

- In the promotion, stress the unique selling point of this pop-up experience museum: that it is a sustainable museum and that the exposition is made of products made of recycled plastic in which visitors are allowed to touch and feel the products, interacting with the material.
- Reminding people of urgency to visit the pop-up experience museum as it is a temporal exposition. Give people the feeling of missing out on the experience.
- Share real-time content of people having fun in the pop-up museum and on the route, and repost content shared by visitors on the timeline and in stories.
- When done sustainably, another thing that should be considered is to provide stickers or buttons. This helps spread the message and lets people show they are supporting the transition into recycled plastic as the new norm. It provides them with a feeling of belonging to something, a community feeling. This can also be in the form of an online badge. In this way, businesses and people can also online show their support. It will enable a form of social comparison and help to spread the new social norm of recycled plastic as a standard, as was discussed as a recommendation in chapter 5.

#### Post-pop-up

- An evaluation is needed to determine if the pop-up experience museum and the Plastic Quest were a success. If so, it should be considered to prolongate the pop-up museum.
- When the pop-up museum has come to an end, it is essential to keep engagement with the followers on social media. Keep on reposting the content of visitors, reminding them of the good memories and the message of the museum.
- The Plastic Quest can continue to exist. Update and provide teasers of new locations and joining businesses.
- Continue with the creation of a community feeling, a feeling of belonging to something. Provide businesses that incorporate recycled plastic in their business with a special badge. In this way, they can proudly show they are part of the transition movement into recycled plastic as the standard norm.
- Create excitement by sharing teasers for the future pop-up experience museum. Try to find a new location for the pop-up experience museum and think of designing a collection in collaboration with another brand or artist.
- Keep on engaging with celebrities. Let existing partners use the special badge in their promotions. Try to find a celebrity who wants to partner for a longer period of time for the upcoming events, acting as an ambassador for the transition of virgin plastic to recycled plastic.

#### 8.4.3. Resources

In horizon two, it is important to keep on

exploiting the social media channels. The municipality of Almere and Save Plastics should keep high engagement with the socials by creating interesting content. Besides, a badge should be created that can be distributed to the participating businesses of the Plastic Quest so that they can show on social media and in their business that they are part of the Quest (and thus the movement). This enhances the community feeling of belonging to something and supports the road into transitioning to recycled plastic as the norm.

The overview of products made of recycled plastic needs to be updated continually. By doing so, it can be evaluated if the Plastic Quest can be expanded or a new Quest can be created. The web application of the Plastic Quest has to be updated with the new locations and the new questions.

Besides, it is suggested to dedicate someone in managing the affairs with the participating businesses to provide a good relationship and ensure good communication.

It is crucial for the pop-up museum to dedicate or hire someone who will definitely transform the host location into a magical, fun experience that visitors want to document and share with others. The design of the pop-up experience museum is a good opportunity to collaborate with local artists or designers. An artistic touch will help to transform the space into an instagramable room. Co-designing (parts of) the pop-up museum also shows support towards sustainable local artists, providing them with the opportunity to expose their work.

Close collaboration with Save Plastics is needed for the designs of the pop-up experience museum to ensure the designs are feasible to make and to oversee the products and objects that are made.

## 8.5. Horizon 3: Frontrunners of the movement Level up

### 8.5.1. Goal

The goal of the third horizon is to level up and expand the pop-up museum and possibly the Plastic Quests to other cities and events, thus bringing the story to other places. Over the years, Save Plastics and the municipality of Almere will gain expert status in the transition towards recycled plastic as the norm; they will be the living example (and frontrunners) of a circular plastic waste stream. Save Plastics becomes a familiar, trusted brand name, using their knowledge and expertise to collaborate with other brands and municipalities to make products made of recycled plastic, cancelling out the production of virgin plastic. By working with an ambassador program, the municipality of Almere and Save Plastics will be creating a community with supporters and driving spirits of the “movement” of using recycled plastic as the standard norm.

### 8.5.2. Product

#### What?

After the first pop-up experience museum in Almere, Save Plastic and the municipality will continue in sharing their story of a circular plastic waste stream. Preparations have to be made to open another pop-up experience in Almere or a nearby city. This time with other designs for the rooms and at another location. Again, one of the affiliated businesses can be the host for the location. Besides, the Plastic Quest needs to be updated with the new businesses and products made of recycled plastic. Because of the flexibility of the pop-up experience,

the opening terms can be evaluated per situation to determine when and if the experience will close.

Furthermore, Save Plastics and the municipality of Almere will level up and search for opportunities to expand the concept of the pop-up experience museum made of recycled plastic to other cities, places or events. In this way, the story will expand, and more people can encounter products made of recycled plastic in different situations and municipalities.

Over the years, the Plastic Quests and the pop-up experience museums will contribute to creating a supportive base. This supporting base for change keeps growing as more businesses will join the circular plastic waste movement. In the third horizon, Save Plastics and the Municipality of Almere will continue building up a community of people, brands, businesses and celebrities who (publicly) show their support for the transition towards recycled plastic as the standard norm. Focussing on the endorsement by friends, brands, businesses, and celebrities will help to enhance the consumers’ acceptance of products made of recycled plastic. At the end of horizon three, Save Plastics should be a strong brand name by itself and have gained the reputation of the expert in the field of transforming waste plastic into valuable products and applications. Save Plastics, and the Municipality of Almere will be seen as frontrunners and use their expertise and knowledge to help other municipalities and businesses to transform their plastic waste stream.

### The Plastic Quests

In the third horizon, hopefully, there will be a lot of local businesses and products affiliated with the Plastic Quest. It would be interesting to investigate if it is possible to create routes with a specific theme or linked to a part of the city, so people can decide for themselves what kind of applications of the products made of recycled plastic or which part of the city they want to explore. Examples of such themes could be, exploring nature, buildings, Almere Harbour.

For the municipality of Almere, the Plastic Quests were relatively easy to implement as the Green Strip could be used as a stepping stone. Expanding the concept of the Plastic Quest to other municipalities is probably a bit more complicated as this municipality needs to have products made of recycled plastic in their public area. However, Save Plastics can share their knowledge and expertise to help other municipalities transform their waste plastic into products for the public area with their facilities of the green plastic plant.

### The pop-up experience museums

As the concept of the Plastic Quest is more difficult to expand to other cities at once, it is suggested to expand the concept of the pop-up experience museum first as a separate element. Such an extension does not have to be big and should start small with one or two experience rooms, just as in Almere. The plastic that was used for the pop-up museum in Almere can be reused/exchanged to build the new pop-up experiences or recycled again to create new scenery. Collaborations with brands and local artists should be searched for to co-design the pop-up experience. This is often

done by brands. For example, the singer-songwriter Billie Eilish collaborated with the fashion brand H&M to design a clothing collection. This collection was called BILLIE EILISH X H&M. This would be an interesting thing to do for Save Plastics, giving every pop-up experience another unique twist.

For the expansion, Save Plastics and the municipality of Almere should not stay limited to their connections with other municipalities. They should also think of events. These events could include big innovation fairs (such as the Dutch Design Week), events that invest a lot of effort and time in providing people with an experience (such as a theme park) or events on which a lot of (single-use) plastic is being consumed (such as concerts or festivals) mini plastic plant would be a great activity to include on such an event. For example, people can bring their used cups and with a certain amount, they can transform it into a consumption coin. Besides, collaborating with existing museums can be an interesting opportunity to as they already have facilities available. Vica-versa it can be interesting for existing museums as well to host a temporary plastic pop-up collection to attract younger visitors to their museum, innovating the idea of a traditional museum.

The idea of the simulation avatar could be an interesting addition to one of the pop-up experiences as evaluated in chapter 7. For the visitors, it would be a fun activity to play around with different attributes. The effects of the changes can be made tangible. That can be done digitally, but it would contribute more to the experience if it were more in a physical sense. This can be done by letting visitors select attributes by twisting physical knobs in the

room. Different combinations will provide different results that can be shown on display, such as more plastic in the sea and dead fish or more happy animals.

### 8.5.3. Marketing

Over the years of the third horizon, Save Plastics and the municipality of Almere will continue with creating exposure for the products and applications made of recycled plastic. While doing so, they try to create brand recognition of Save Plastics, emerging as a familiar, trusted brand in the field of recycled plastic products and applications. Therefore, it is important to include Save Plastics with a logo or reference in all kinds of promotions, online and offline. To promote these new pop-up experience museums to other places, the same marketing principles described in horizons one and two apply.

However, in horizon three, the focus will also be on establishing a community with advocates for Save Plastics and the municipality of Almere and the transition towards recycled plastic as the standard norm. Save Plastics and the municipality

of Almere should continue to find ambassadors and buyers for their products. They have to make sure that the people and organizations that support the transition movement can show that they are part of the community. Just as in horizon two, the supporters should be provided with badges or emblems so they can show they are proud supporters of the transition movement on their websites, social media channels and offline communication. As was discussed before, it is interesting for Save Plastics to collaborate with events, artists or celebrities for the design of the pop-up experiences museums at other places to make it fit in the new context. In this way, new and more people are reached as the target group of the one collaborating with is included. The branding of such an event could be “Save Plastics X name collaborator” or “Name Collaborator for Save Plastics”. A good example of how such an experience could look like is the Louis Vuitton X Exhibitions (see Figure 60). By such collaborations, the partners show their endorsement in the products, enhancing trust and the social approved norm.



**Figure 60:** Louis Vuitton created several immersive experiences in collaboration with artists in Los Angeles with the name Louis Vuitton X. This is a good example of an experience that can be made of the recycled plastic in collaboration with artists or brands that showcase products. ( Louis Vuitton, 2019).

Ambassadors for Save Plastics and the transition towards recycled plastic can play a major role in consumers' acceptance of products made of recycled plastic. Therefore it is elaborated a bit more on how to attract them and work with them. This information is based on my own knowledge and past experiences with the topic and reading several articles. Liu (2020), Hyatt (2021, May 13) and Firstbird (2021, June 3) provided valuable insights into the topic and how to enforce a community-driven brand.

### Ambassador Program

An ambassador makes the connection with a brand or company more personal; it gives a human touch. They are representatives for the brand and are passionate and support where it stands for. It can be compared with a fanbase of a band or artist. As discussed in chapter 5, people heavily rely on recommendations and experiences from friends and family and reviews from others in their purchase decisions. When this happens, one could say that they have acted as an ambassador for the product or brand. An ambassador program for Save Plastics and the transition movement can help to increase the awareness and popularity of the brand and movement, creating a community.



It is important to keep in mind that not only celebrities or brands can be ambassadors. Almost everyone can have an influence on the behaviour of someone else. An employee of the municipality of Almere or Save Plastics can also become an ambassador as he/she is a good representative of the organisation, knowing the ins and outs, they are already experts. Besides, an employee is probably motivated to promote Save Plastics or the municipality of Almere. Next to employees, the people that rave online about the products made of recycled plastic are potential ambassadors as they probably talk about and promote it in their inner circles, and as discussed before, people tend to trust the experiences of friends and family. As a matter of fact, the participating local businesses in the Plastic Quest can be seen as ambassadors as they actively choose to be part of it. The same applies when collaborating with brands or artists to design a room for the pop-up experience museum. The endorsement of products made of recycled by brands, celebrities, authorities and friends all contribute to increasing the trust in and the familiarity of products made of recycled plastic. Therefore it is best to work towards a combination of ambassador types, combining their strengths.

The steps for the ambassador program are divided into the phases pre-ambassador, during-ambassador and post-ambassador, to keep the same structure as in other horizons.

### Pre ambassador

- The search for ambassadors actually already starts in the other horizons. It is important to monitor who is actively sharing the Plastic Quest and the pop-up experience museum on social media. People that are actively sharing posts or commenting below posts show a certain dedication and enthusiasm for routes and museums. This enthusiasm is important in influencing the behaviour of others, as was discussed in chapter 5. However, it is good to check if this enthusiasm is also linked to the use of recycled plastic and not just for example, because they liked the colours. Besides, it is also good to monitor any negative aspects shared about the pop-up experience museum and the Plastic Quest or Save Plastics. If so, it should be tried to fix these negative aspects.
- The municipality of Almere and Save Plastics should make people aware that they are starting an ambassador program. They can do this by sharing this online and including it as a message in the web application of the Plastic Quests and offline with a sign in the pop-up experience museum. Asking people to leave their email when interested makes it easier to reach potential ambassadors.
- It is easiest to recruit potential ambassadors where Save Plastics and the municipality of Almere already do marketing. This is on social media, at the locations and participating businesses of the urban game route, and pop-up experiences. Ask people to write about their experiences or leave a comment.
- Talk with visitors of the pop-up experience museum face-to-face. By doing so, it could be identified

if someone could be a potential ambassador. When the feeling is right, this visitor could be asked personally if he/she has an interest in being an ambassador.

- Check the ideals of the potential ambassadors. They need to be in line with the ones of Save Plastics and the municipality of Almere for good congruence. Besides, it should be checked whether promoting products made of recycled plastic provides value to the ambassador's audience.

#### During ambassador

- When the right ambassadors are found, it is vital to provide them with content they can share with others. This can include posts, logos or figures they can post on social media, but also merchandise of Save Plastics. The badge to show support and participation in the movement is a good example to provide to the ambassadors, and it is a form of showing commitment, which is discussed as a strategy for sustainable behaviour in chapter 3.
- Provide the ambassadors with a free sample of a product made of recycled plastic or invite them to (be the first to experience) the pop-up experience museum, so they can review it and share their experiences with others.
- Ambassadors should encourage others to try the products made of recycled plastic themselves or visit the Plastic Quest or pop-up museum and defend Save Plastics against people that are dissatisfied by reversing bad reviews.
- Ambassadors could also be asked to help and promote at a pop-up experience booth on an event or festival.

- It is essential to keep the ambassadors engaged. Give them updates and especially share the success stories. Show them new possibilities and applications of recycled plastic products and give them insights about future plans, for example, plans for co-creating an experience room with a local artist or a brand. Keep them excited and enthusiastic.

#### Post ambassador

- To avoid ambassadors becoming post-ambassadors, it is vital that Save Plastics and the municipality of Almere maintain a good relationship with their ambassadors. They have to show their appreciation for the ambassadors' efforts by providing them with something in return.
- Thank the ambassadors by organizing exclusive ambassadors only events. Provide them with free products made of recycled plastic or free entrance at the pop-up experience museum or merchandise. Another idea could be that a special unique ambassador product is designed every year and that ambassadors can obtain this product by recycling their own plastic waste for free.
- Such favours, like free products or discounts, also serve as incentives to attract ambassadors in the first place.
- If it is impossible to find ambassadors for these conditions, it is possible to provide them with a monetary incentive. In this case, it could be considered to pay people to be an ambassador of the movement, just to get the ball rolling and keep it rolling. However, the risk could be that someone that is paid, is

less passionate about recycled plastics and Save Plastics than an ambassador who isn't paid and does it out of their own passion, resulting in fewer posts and promotion in the inner circle.

- It is good to plan evaluation sessions with the ambassadors to receive feedback and investigate which improvements could be made. Besides, the ambassadors could have some cool ideas for the future of the community, the Plastic Quest and the pop-up experiences.
- To conclude, it is important for Save Plastics and the municipality of Almere to take good care of the movement's ambassadors and keep them happy, working on long-time relationships. Long-term relationships will also help attract other advocates for the movement as it shows them the contentment of the affiliated ambassadors, providing Save Plastics with new opportunities.

#### 8.5.4. Resources

For horizon three, it is suggested to have someone dedicated to searching for new collaborations and opportunities with artists and brands to expand the pop-up experiences to other places, events or festivals. It is still suggested that someone manage the external affairs to ensure good relations and communication now that the concepts expand. As this horizon focuses on creating a strong community with an ambassador program with Save Plastics and the Municipality of Almere as experts and driving spirits, it is suggested to hire someone that has experience in managing a community. This community manager will be responsible for managing the ambassadors, keeping them happy, and

keeping them engaged in promoting the movement and Save Plastics.

Besides, the right content that the ambassadors can share needs to be created, such as the aforementioned logos, posters, flyers, social media posts and badges.

A way to showcase the ambassadors should be investigated to show appreciation for the ambassadors and to make others aware of the ambassador program. This can, for example, be a dedicated page on the website of Save Plastics or a post on social media. Another interesting opportunity would be to have a blog page on which ambassadors can write about the products and their experiences. In this way, they also can connect to new people.

It is still crucial to hire, collaborate with or dedicate someone that will transform the pop-up experiences into a magical place. Executing brainstorm sessions and co-creation sessions can help to create new concepts and activities for the pop-up experience rooms that inform the visitors about the benefits of recycled plastic products and envision the future in a fun way.

Close contact with Save Plastics is needed to make sure the designs for the experience rooms are feasible and to check that Save Plastics is able to manage the demand for transforming waste plastic into the products.

## HORIZON 1 | 2022

## HORIZON 2 | 2023

## HORIZON 3 | 2026

## FUTURE VISION

### GOAL

### THE PLASTIC QUEST: THE GREEN STRIP

Creating awareness for the possibilities of products made of recycled plastic and exciting for the Floriade Expo 2022.

### POP-UP EXPERIENCE MUSEUM

Keeping the vibe of the Floriade Expo 2022 alive by providing an immersive try-out experience with products made of recycled plastic.

### SCALE-UP AND DRIVERS OF THE MOVEMENT

Expanding to other cities/events and building a supportive community for the transition towards recycled plastic as the standard norm.

### PRODUCT



The Plastic Quest: the Green Strip



Update Plastic Quest

Opening pop-up museum



Themed Plastic Quests

Expand to other cities and events

Co-designed pop-up experiences

Ambassador program

### MARKETING

Campaign by municipality

Announcing ambassador program

Creating Instagramable moments

Opening by celebrity

Opening by celebrity

Co-branding experiences

Community of advocates

### RESOURCES

Social media expert: Instagram & Facebook

Game developer

Game developer

Experience designer(s)

Ambassador community manager

*"The municipality of Almere and Save Plastics will be drivers and frontrunners in the transition to a circular plastic waste stream of repurposing local plastic waste into new valuable products; Through community building, the acceptance of products made of recycled plastic is enhanced, ensuring sustainable consumption and production of plastic."*

*This vision will be reached by "making benefits of products made of recycled plastic tangible in a fun, informative experience to the broader public, making recycled plastic the standard norm."*



## 9. DISCUSSION

In this concluding chapter, there will be reflected on the project. First, the contribution of the thesis will be discussed, followed by the limitations of the project and the conclusion.

## 9.1. Thesis contribution

The environmental problems are very complex, and there is not one solution to solve them. Multiple actions and steps on all kinds of levels are needed to contribute to the bigger picture. By researching how consumers' acceptance of products made of recycled plastic can be enhanced, this thesis contributed to Goal 12, *ensure sustainable consumption and production patterns*, and goal 13, *take urgent action to combat climate change and its impacts* (United Nations General Assembly, 2015) of the Sustainable Development Goals.

Multiple design recommendations from a consumer perspective were defined to incorporate the acceptance of products made of recycled plastic, and thus a positive purchase decision of products made of recycled plastic among consumers. These design recommendations ensure the consumption of products made of recycled plastic, preventing the production of more virgin plastic. Doing so stimulates that plastic waste is seen as valuable and transformed into new objects, avoiding being incinerated and reducing the impact on the environment.

This thesis provides a better understanding of how products made of recycled plastic are perceived by consumers. The EKB decision-making model was used to investigate the barriers, risks and benefits consumers experience and perceive with products made of recycled plastic. Extensive literature study and qualitative user research resulted in eight design recommendations: *Inform about product detail, make it tangible, make it attractive, make it fun, create social influence, stimulate*

*try-out, stimulate familiarity, and build trust*. Implementation of the design recommendations will enhance that the product made of recycled plastic enters the final consideration set (stage two of the EKB decision-making model) and stimulate a positive evaluation of the perceived risk and benefits, resulting in a positive purchase decision of products made of recycled plastic (stage three of the EKB decision-making model).

Besides providing the Interreg North-West Europe TRANSFORM-CE project with design recommendations, this thesis subsequently provides the municipality of Almere and Save Plastics, two key partners of the TRANSFORM-CE project, with a possible implementation plan of the design recommendations. The roadmap that was created can be used as starting point on how they can enhance the consumers' acceptance of products made of recycled plastic, becoming leaders in the transition towards circular municipal plastic waste streams with a strong supportive community.

## 9.2. Limitations

As a qualitative user study is time-consuming for both the participant and the researcher, the recruitment of participants for the context mapping study was mainly done by convenient sampling; most of the participants are master students, just like myself. The insights from the analysis are applied in the design recommendations. It should be kept in mind that master students are not the representatives of all Millennials and Generation Z. For example, students' awareness and knowledge about sustainability and recycled plastic seemed to be highly influenced by the high education level of the students, and because of this, they are probably more motivated to take action. However, there are also insights that probably won't apply only to students, such as the inspiring social network or the preference to have a fun experience. Therefore, more research is needed with a more diverse and representative group (not only master students) of Millennials and Gen Z to verify the insight analysis conclusions. Nevertheless, the participants still belong to Millennials or Gen Z, so therefore still match the target group of the roadmap.

It should be mentioned that the clustering process of the insight analysis is done by one person only. The making of statement cards demands the designers' interpretation of the quotes. Therefore it is sensitive to biases. Usually, the clustering process will be conducted by multiple people, allowing for discussing the different interpretations. As the graduation project is an individual project, this was not possible. I tried to remain as objective as possible during the entire insight analysis, but it

cannot be excluded that unconscious bias has occurred.

This graduation project was conducted in the middle of the COVID-19 pandemic, which caused extra challenges and constraints. Due to the social distancing regulations that came with the COVID-19 pandemic, it was not possible to have physical meetings, making it harder to connect with people. Therefore an online format was chosen, and all meetings were conducted online. Although I became somewhat an expert in working in an online environment the past one and a half years, it is much harder to connect with the people on the other side of the screen. It took much more time, effort and energy to prepare and to create the creative vibe that is needed. I ended up working more individually at moments I usually would not do so. As a result, there were fewer meetings with stakeholders/people and fewer co-creation sessions, providing this project with a less holistic perspective as I wished for.

For this project, a future vision for the municipality of Almere and Save Plastics was defined after one evaluation meeting with the municipality of Almere. This was done based on the insights of that meeting, the design recommendations, qualitative study, the literature review and the pressure cooker. However, it would have been interesting to have created the future vision together in a co-creation session with the municipality of Almere and Save Plastics to ensure everyone is on the same page. Therefore, it is suggested to do an evaluation session or interview and possibly a co-creation session with the municipality of Almere and Save Plastics to align the future vision and make another iteration

on the roadmap. Besides, the roadmap and implementation plan for the municipality of Almere and Save plastics is definitely not the only way of applying the design recommendations. Of course, there could be other ways and ideas on how they could have been applied, but this way seemed to be most fitting the context of the project.

It is a unique position that the municipality of Almere has currently. They are sort of the middle man between Save Plastics and other businesses. It is hard for a municipality to maintain this position or grow out to more of a brand. Therefore, in my opinion, it would be better if the municipality of Almere puts their effort into the endorsement of Save Plastics and their products so they can grow into a strong, familiar and trusted brand. In this way, I think the most environmental impact can be made with the green plastic plant in the end.

Ideally, it would be interesting for the municipality of Almere to not only include recycled plastic in the Plastic Quests and the pop-up experiences but other sustainable developments and solutions as well, such as the 3D printed concrete bridge mentioned in the meeting with the municipality of Almere. I think it would be good to include and support sustainable initiatives as a municipality, and further research can be done on this. However, this was not in the scope of the project. Therefore, only products made of recycled plastic are included in the roadmap.

Lastly, it should be mentioned that not only measures to stimulate the uptake of products made of recycled plastic by consumers should be taken, but also financial incentives need to be generated.

The recycled plastic material has to be able to compete with virgin plastic directly. Only then will it be considered a suitable alternative by companies. The recycling of low-quality plastics is still far more expensive than producing virgin plastic. Competitive pricing is needed for Europe to compete with markets, such as China. Real radical change will come when there is legislation and regulations from the national and EU government. For example, taxes on virgin plastic resources or lowering the tax rates for labour as the recycling process is still labour intensive. Still, this project tries to make a real impact by pushing for change from the consumer side. Hopefully, something starting small can grow into something big.

### 9.3. Conclusion

This graduation project researched how the consumer acceptance of products made of recycled plastic could be enhanced. It provided a great understanding of how products made of recycled plastic are perceived by consumers. Through the process of a pressure cooker, literature review and qualitative user research resulted in eight design recommendations: *Inform about product detail, make it tangible, make it attractive, make it fun, create social influence, stimulate try-out, stimulate familiarity, and build trust*. These design recommendations were translated in a roadmap for the specific case of the municipality of Almere and Save Plastics, both key partners of the TRANSFORM-CE project of which this graduation project is part. The roadmap provides them with a detailed process on how they can enhance the consumer acceptance of products made of recycled plastic and grow into leaders in the transition movement towards recycled plastic as the standard norm for production by making the benefits of products made of recycled plastic tangible in a fun, informative experience for people. They will be the living example of a circular municipal plastic waste stream.

This thesis makes a contribution to Goal 12, *ensure sustainable consumption and production patterns*, and goal 13, *take urgent action to combat climate change and its impacts* of the Sustainable Development Goals adopted by all United Nations Member States. By enhancing the consumption of products made of recycled plastic, the production of virgin plastic is limited, reducing the impact on the environment. Hopefully, it will make the world a better place!

## 10. PERSONAL REFLECTION

Wow, I have made it to an end! One week from now, I will be presenting this graduation project and becoming an official graduate of the master of Strategic Product Design. It almost feels unreal that almost seven years of studying has come to an end. It feels there is so much more to learn and experience, and I am looking forward to what and who crosses my path.

At the end of my bachelor of Industrial Design at the Eindhoven University of Technology, my interest grew in motivating and stimulating behaviour change in people by using persuasive principles, such as playful interactions or serious gaming. With the master of Strategic Product Design at the Delft University of Technology, I wanted to learn how I could take this interest to a more strategic level, designing for the wicked problems in the world. Again, I experienced that I am really interested in the psychology behind people's choices and how I can design opportunities and strategies to influence those choices to contribute to a bigger picture, such as sustainability or reducing pollution by plastic waste.

Therefore, I was really enthusiastic about this graduation project as I could dive into the behaviour and decision making of consumers and define design recommendations and a strategy to enhance this consumers' acceptance of products made of recycled plastic. While working on this project, I became even more aware that it is needed to take action now to tackle the environmental problems. Multiple times, it frustrated me that recycled plastic is not seen as a valuable resource by companies and organizations. I am happy that I got the opportunity as a designer to change this image of recycled plastic by influencing the way people consume, indirectly limiting plastic waste.

At the start of the project, I knew from past experiences that I could get overwhelmed by such big projects as a graduation project and don't know how or where to start. Therefore I think the decision to start with a pressure cooker was a good move and worked out quite well. It forced me to just start doing something and accept that it is not possible to research everything as there was only a limited time of one week. It gave me a lot of positive energy.

I think I thrived the most in the first diamond. I enjoyed digging into the literature, learning more and more about recycled plastic and the decision behaviour of consumers. I am proud of how I managed to execute the context mapping study. I know that I am a person that gains the most creative energy by collaborating and talking with others. However, I think this was also my pitfall. I found it hard to define what was in the scope of

my project and what was not as it is such a big and complex topic. This was, on the one hand, very exciting, but also frightening at the same time.

I experienced difficulties in bringing all the information that mattered together. I constantly wanted to research more, figuring out all the context and experiences, as leaving things uncovered gives me an uncomfortable feeling. For example, I spent way too much time on the analysis of the context mapping study. I did this way to detail by transcribing all the interviews, and I got very enthusiastic in the clustering process as this felt like solving a puzzle. I couldn't force myself to move on as I was too worried I would lose valuable information. But as a consequence, I think

I was able to make a detailed profile of the students and pinpoint the essential elements in their relation with products made of recycled plastic. The extensive clustering process helped me to create a feeling for what was important to include in the design recommendations to really affect people/consumers. In the second diamond, I think I learned more to accept that there is a limited time for the project. It is not possible to research everything, and that is okay.

Working on my own again was something that I found difficult. Especially during these corona times, a graduation project can be lonely. Naturally, I am a person that loves to be surrounded by people and shines the most when collaborating and working together with others. I missed the coffee breaks with my fellow students, discussing the struggles they encountered or just having a chit chat. I tried to stay connected with them by having regular zoom meetings, but I noticed it is easy to zone back in your bubble again. Ironically, in teams, I often have a leading role, ensuring everyone is involved and on track with the planning. But in my own project, I found it hard to manage myself to make decisions and move on. However, it was a very comforting feeling that when I reached out to friends or my supervisors, they were there for me to help. Looking back, I should have done that way more often and not keeping stuck in my own head, because it wasn't perfect enough to show. That is what I should advise other graduate students as well: Don't be afraid to ask for help from others and show them your work; you are not alone in it.

When there would have been more time, I would have loved to do a co-creation session with the municipality of Almere and Save Plastics and involve them in the creation of the roadmap. The evaluation meeting with the municipality of Almere was already really insightful, and I believe that a co-creation session would have provided me with some more guidance and confidence that the implementation plan that I created is valuable for them

and will be executed. However, instead, I learned to trust my research findings and intuition throughout the project, and therefore I believe that the roadmap provides the municipality of Almere with a valuable plan and recommendations to enhance consumers' of products made of recycled plastic.

One of the biggest challenges was academic writing. I think this is also one of the main reasons I deviated from the expected planning. I found it way harder than expected to write all my insights down, finding the balance between a design report and an academic paper. Additionally, I also experienced having trouble writing concisely, ending up with long pieces of text and taking more time. My supervisors probably would have thought, "why are you doing this to yourself?" I tried to work in a more visual way. However, when I tried to do so, I noticed myself spending too much time on the details, trying to make it perfect. In the end, it didn't end up in this thesis. I truly believe that making good visualizations can be a core quality of a strategic designer in making complex situations tangible/visual. Therefore, I want to continue practising my visualization skills, trying to let go of the fear and gain more confidence in drawing.

In the end, I am really proud of the result of this project. I think it reflects who I am, and who I want to become as a designer. I think I managed very well to identify and research the problem first and then come to a solution in an iterative way and not the other way around. I really hope that my thesis inspires others to change their behaviour and that the transition towards recycled plastic as the standard norm will be made sooner rather than later.

Because recycled plastic is fantastic!



## 11. REFERENCES

[Groene Planten Wand]. (n.d.). Groene Planten Wand. <https://shop.onlineoutlet2021.ru/content?c=plantenwand%20binnen&id=31>

Ball, B. J. (2019). *The Double Diamond: A universally accepted depiction of the design process*. Design Council. <https://www.designcouncil.org.uk/news-opinion/double-diamond-universally-accepted-depiction-design-process>

Bateman, A., & Bonanni, L. (2019). *What Supply Chain Transparency Really Means*. Harvard Business Review. <https://hbr.org/2019/08/what-supply-chain-transparency-really-means>

Baxter, W., Aurisicchio, M., & Childs, P. (2017). Contaminated interaction: another barrier to circular material flows. *Journal of Industrial Ecology*, 21(3), 507-516.

Bei, L. T., & Simpson, E. M. (1995). The determinants of consumers' purchase decisions for recycled products: an application of acquisition-transaction utility theory. *ACR North American Advances*. Pages 257-261

Bickart, B. A., & Ruth, J. A. (2012). Green eco-seals and advertising persuasion. *Journal of advertising*, 41(4), 51-67.

Bray, J., Johns, N., & Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. *Journal of business ethics*, 98(4), 597-608.

Brooks, A. L., Wang, S., & Jambeck, J. R. (2018). The Chinese import ban and its impact on global plastic waste trade. *Science Advances*, 4(6), eaat0131. <https://doi.org/10.1126/sciadv.aat0131>

Bucknall, D. G. (2020). Plastics as a materials system in a circular economy. *Philosophical Transactions of the Royal Society A*, 378(2176), 20190268.

Calvo-Porral, C., & Lévy-Mangin, J. P. (2020). The circular economy business model: Examining consumers' acceptance of recycled goods. *Administrative Sciences*, 10(2), 28. <https://doi.org/10.3390/admsci10020028>

Catulli, M., Lindley, J. K., Reed, N. B., Green, A., Hyseni, H., & Kiri, S. (2013). What is Mine is NOT Yours: Further insight on what access-based consumption says about consumers. In *Consumer culture theory*. Emerald Group Publishing Limited.

Cognite Marketing. (2019, 2 July). *How long does it take to build a brand?* <https://www.cognite.co.za/how-long-does-it-take-to-build-a-brand/#:%7E:text=The%20time%20frame%20in%20which,establish%20within%20the%20market%20place>.

Deana. (2020). *Importance of positive customer experience for your business*. Innovation cloud. <https://innovationcloud.com/blog/importance-of-positive-customer-experience-for-your-business.html>

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological inquiry*, 11(4), 227-268.

Department of Energy and Climate Change & the Behavioural Insights Team (2014). *Evaluation of the DECC/John Lewis Energy Labelling Trial*. London: Department of Energy and Climate Change. Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/350282/John\\_Lewis\\_trial\\_report\\_010914FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/350282/John_Lewis_trial_report_010914FINAL.pdf)

Dirty Science. (2017). *De mooiste bibliotheek van Nederland: de Boekenberg*. <https://dirtyscience.nl/bibliotheek-boekenberg-spijkenisse/>

DUX. (2011). *Method 4 of 100: Reverse Brainstorming*. Designing the User Experience at Autodesk. <https://dux.typepad.com/dux/2011/01/this-is-the-fourth-in-a-series-of-100-short-articles-about-ux-design-and-evaluation-methods-todays-method-is-called-rever.html>

EcoBlocks & Tiles. (2019). [Ecotiles made from recycled plastic for Aesthetically appealing eco-friendly roof]. <https://www.ecoblocksandtiles.co.ke/>

Engel, J.F., Kollat, D.T., Blackwell, R.D. (1968). *Consumer Behavior*. Holt, Rinhart & Winston, New York.

First Insight, Inc. (2021). *Sustainable Retail | First Insight*. First Insight. <https://www.firstinsight.com/sustainability-in-retail>

Firstbird. (2021, June 3). *Brand Ambassadors: Who Are They and What Do They Do?* <https://www.firstbird.com/en/hr-glossary/brand-ambassador/>

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science advances*, 3(7), e1700782.

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *American psychologist*, 66(4), 290.

Greifeneder, R., Scheibehenne, B., & Kleber, N. (2010). Less may be more when choosing is difficult: Choice complexity and too much choice. *Acta psychologica*, 133(1), 45-50.

Grewal, D., Gotlieb, J., & Marmorstein, H. (1994). The moderating effects of message framing and source credibility on the price-perceived risk relationship. *Journal of Consumer Research*, 21(1), 145-153.

Gutierrez, A. M. J., Chiu, A. S. F., & Seva, R. (2020). A proposed framework on the affective design of eco-product labels. *Sustainability*, 12(8), 3234.

Hamzaoui Essoussi, L. H., & Linton, J. D. (2010). New or recycled products: how much are consumers willing to pay?. *Journal of Consumer Marketing*, 458–468

Hamzaoui-Essoussi, L., & Linton, J. D. (2014). Offering branded remanufactured/recycled products: at what price?. *Journal of Remanufacturing*, 4(1), 1-15.

Heidbreder, L. M., Bablok, I., Drews, S., & Menzel, C. (2019). Tackling the plastic problem: A review on perceptions, behaviors, and interventions. *Science of the total environment*, 668, 1077-1093.

Hsu, H. Y., Chen, W. Y., Weng, C. S., & Lin, S. P. (2008, July). Risk-reduction strategies for internet shopping of search goods and experience goods. In *PICMET'08-2008 Portland International Conference on Management of Engineering & Technology* (pp. 1052-1059). IEEE.

Hyatt, A. (2021, May 13). *How to Recruit Brand Ambassadors To Fast-Track Your Marketing*. Constant Contact. <https://blogs.constantcontact.com/brand-ambassadors/>

Iberdrola. (2019). Plastic In The Oceans. <https://www.iberdrola.com/environment/plastic-in-the-ocean>

Interreg North-West Europe TRANSFORM-CE. (2021). *TRANSFORM-CE - TRANSFORMing single use plastic waste into additive manufacturing and intrusion-extrusion moulding feedstocks and creating a new Circular Economy model for NWE*. Interreg NWE. <https://www.nweurope.eu/projects/project-search/transform-ce-transforming-single-use-plastic-waste-into-additive-manufacturing-and-intrusion-extrusion-moulding-feedstocks-and-creating-a-new-circular-economy-model-for-nwe/#tab-1>

Issue Cards | Service Design Tools. (n.d.). Servicedesigntools.Org. Retrieved at June 2021, from <https://servicedesigntools.org/tools/issue-cards>

Jamar, P. J. (2020). *The Congruent Effects of Co-branding Green, Ecologically-Friendly Ads*. Michigan State University.

Jisana, T. K. (2014). Consumer behaviour models: an overview. *Sai Om Journal of Commerce & Management*, 1(5), 34-43.

Johnstone, M. L., & Tan, L. P. (2015). Exploring the gap between consumers' green rhetoric and purchasing behaviour. *Journal of Business Ethics*, 132(2), 311-328.

Kok, G., Gottlieb, N. H., Peters, G. J. Y., Mullen, P. D., Parcel, G. S., Ruiter, R. A., ... & Bartholomew, L.

K. (2016a). A taxonomy of behaviour change methods: an intervention mapping approach. *Health psychology review*, 10(3), 297-312.

Kok, G., Gottlieb, N. H., Peters, G. J. Y., Mullen, P. D., Parcel, G. S., Ruiter, R. A., ... & Bartholomew, L. K. (2016b). Tables and Figure for - A taxonomy of behaviour change methods: an intervention mapping approach. *Health psychology review*, 10(3), 297-312

Lankhorst Recycling Products. (2012). *Nieuwsbrief Lankhorst Recycling Products*, 12 #1. yumpu.com. <https://www.yumpu.com/nl/document/read/9343534/nieuwsbrief-lankhorst-recycling-products-12-1>

Liu, L. (2020, December 12). *5 Ways to Gain Brand Ambassadors (And Keep Them)*. Duct Tape Marketing. <https://ducttapemarketing.com/brand-ambassadors/>

Louis Vuitton. (2019). *Louis Vuitton X Exhibitions* [Picture]. Louis Vuitton X Exhibitions. <https://us.louisvuitton.com/eng-us/magazine/articles/louis-vuitton-x#the-rooms>

Luchs, M. G., Naylor, R. W., Irwin, J. R., & Raghunathan, R. (2010). The sustainability liability: Potential negative effects of ethicality on product preference. *Journal of Marketing*, 74(5), 18-31.

Luu, T. T. A., & Baker, J. R. (2021). Exploring Consumers' Purchase Intention of rPET Bottle-Based Apparel in an Emerging Economy. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 22.

Magnier, L., Mugge, R., & Schoormans, J. (2019). Turning ocean garbage into products—Consumers' evaluations of products made of recycled ocean plastic. *Journal of cleaner production*, 215, 84-98.

Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive science*, 5(4), 333-369.

Martin, I. M., & Stewart, D. W. (2001). The differential impact of goal congruency on attitudes, intentions, and the transfer of brand equity. *Journal of Marketing Research*, 38(4), 471-484.

Matthes, J., & Wonneberger, A. (2014). The skeptical green consumer revisited: Testing the relationship between green consumerism and skepticism toward advertising. *Journal of advertising*, 43(2), 115-127.

Meng, M. D., & Leary, R. B. (2019). It might be ethical, but I won't buy it: Perceived contamination of, and disgust towards, clothing made from recycled plastic bottles. *Psychology & Marketing*, 38(2), 298-312. <https://doi.org/10.1002/mar.21323>

Milieu Centraal. (2018). *Afval scheiden: cijfers en kilo's*. Retrieved at March 17 2021, <https://>

[www.milieucentraal.nl/minder-afval/afval-scheiden/afval-scheiden-cijfers-en-kilo-s/#:%7E:text=In%20Nederland%20produceren%20we%20jaarlijks,en%20drinkpakken%20zijn%20in%20opmars.](http://www.milieucentraal.nl/minder-afval/afval-scheiden/afval-scheiden-cijfers-en-kilo-s/#:%7E:text=In%20Nederland%20produceren%20we%20jaarlijks,en%20drinkpakken%20zijn%20in%20opmars.)

Ministerie van Algemene Zaken. (2018). *Wie is Bob en waar staat Bob voor?* Rijksoverheid. <https://www.rijksoverheid.nl/onderwerpen/verkeersveiligheid/vraag-en-antwoord/wie-is-bob-en-waar-staat-bob-voor>

Mitchell, V. W., & McGoldrick, P. J. (1996). Consumer's risk-reduction strategies: a review and synthesis. *International Review of Retail, Distribution and Consumer Research*, 6(1), 1-33.

Newman, G. E., Gorlin, M., & Dhar, R. (2014). When going green backfires: How firm intentions shape the evaluation of socially beneficial product enhancements. *Journal of Consumer Research*, 41(3), 823-839.

Nguyen, X., Tran, H., Nguyen, Q., Luu, T., Dinh, H., & Vu, H. (2020). Factors influencing the consumer's intention to buy fashion products made by recycled plastic waste. *Management Science Letters*, 10(15), 3613-3622.

Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. *Journal of cleaner production*, 19(16), 1876-1883.

NOS. (2018, january 8). *China wil ons plastic afval niet meer recyclen, dus verbranden we 't maar*. <https://nos.nl/artikel/2211057-china-wil-ons-plastic-afval-niet-meer-recyclen-dus-verbranden-we-t-maar>

Núñez-Cacho, P., Leyva-Díaz, J. C., Sánchez-Molina, J., & Van der Gun, R. (2020). Plastics and sustainable purchase decisions in a circular economy: The case of Dutch food industry. *PloS one*, 15(9), e0239949.

Osei, B. A., & Abenyin, A. N. (2016). Applying the Engell-Kollat-Blackwell model in understanding international tourists' use of social media for travel decision to Ghana. *Information Technology & Tourism*, 16(3), 265-284.

Overstreet, K. (2021). *How consumer behavior affects plastics recycling in America*. Packaging World. <https://www.packworld.com/issues/business-intelligence/article/21342501/how-consumer-behavior-affects-plastics-recycling-in-america>

Park, H. J., & Lin, L. M. (2020). Exploring attitude-behavior gap in sustainable consumption: Comparison of recycled and upcycled fashion products. *Journal of Business Research*, 117, 623-628.

Parker, L. (2020, 5 november). *Maar liefst 91% van plastic wordt niet gerecycled*. National Geographic. <https://www.nationalgeographic.nl/stop-met-plastic/2017/07/maar-liefst-91-van-plastic-wordt-niet->

[gerecycled](#)

Patterson, Trista & Barratt, Sam (2019) *Playing for the Planet – How video games can deliver for people and the environment*. UN Environment/GRID-Arendal. Arendal, Norway

Petro, G. (2020). *Sustainable Retail: How Gen Z Is Leading The Pack*. Forbes. <https://www.forbes.com/sites/gregpetro/2020/01/31/sustainable-retail-how-gen-z-is-leading-the-pack/?sh=51981e5e2ca3>

Pijs, T. (n.d.). *Facebook vs. Instagram: welk kanaal past bij jouw social media strategie?* Coosto. Retrieved from <https://www.coosto.com/nl/blogs/facebook-vs-instagram-welk-kanaal-past-bij-jouw-social-media-strategie>

Plastic Fantastic. (2018). [Pinkpop Sleutelhanger gemaakt van oude plastic drinkbepers]. Plastic Fantastic. [https://scontent-ams4-1.xx.fbcdn.net/v/t1.6435-9/35629082\\_2131034910512512\\_8216445730588459008\\_n.jpg?nc\\_cat=108&ccb=1-3&nc\\_sid=cdb9c&nc\\_ohc=O3nfyHqwbLAAX9JUEWd&nc\\_ht=scontent-ams4-1.xx&oh=3d18fb7ef45a5df98ccbd19ba912625e&oe=60F118DE](https://scontent-ams4-1.xx.fbcdn.net/v/t1.6435-9/35629082_2131034910512512_8216445730588459008_n.jpg?nc_cat=108&ccb=1-3&nc_sid=cdb9c&nc_ohc=O3nfyHqwbLAAX9JUEWd&nc_ht=scontent-ams4-1.xx&oh=3d18fb7ef45a5df98ccbd19ba912625e&oe=60F118DE)

Plastic Fantastic. (2019). *Al dat plastic: Wat doen we ermee?* [White paper]

*Probes for Context Mapping - How to design and use them*. (2020). The Interaction Design Foundation. <https://www.interaction-design.org/literature/article/probes-for-context-mapping-how-to-design-and-use-them>

Rafique, M., & Zafar, Q. U. A. (2012). Impact of celebrity advertisement on customers' brand perception and purchase intention. *Asian Journal of Business and Management Sciences*, 1(11), 53-67.

Roselius, T. (1971). Consumer rankings of risk reduction methods. *Journal of marketing*, 35(1), 56-61.

Ross, K. (n.d.). *The Effective Reuse and Applications for Mixed Plastic Waste*. British Plastics Federation. [https://www.bpf.co.uk/sustainable\\_manufacturing/recycling/Reuse\\_and\\_Applications\\_for\\_Mixed\\_Plastic\\_Waste.aspx](https://www.bpf.co.uk/sustainable_manufacturing/recycling/Reuse_and_Applications_for_Mixed_Plastic_Waste.aspx)

Sanders, E. B. N., & Stappers, P. J. (2012). *Convivial toolbox: Generative research for the front end of design*. BIS.

Santos-Longhurst, A. (2019). *Intrinsic Motivation: How to Pick Up Healthy Motivation Techniques*. Healthline. <https://www.healthline.com/health/intrinsic-motivation#factors>

Save Plastics. (2019). *Plastic duurzaamste optie dankzij nieuwe plasticfabriek*. saveplastics.nl. <https://www.saveplastics.nl/plastic-duurzaamste-optie-dankzij-nieuwe-plasticfabriek/>

Save Plastics. (2021a). *Safe Home* [Photo]. <https://www.saveplastics.nl/perskit/>

Save Plastics. (2021b). [Van plastic afval, naar nieuwe producten]. <https://www.saveplastics.nl/oplossingen/groene-plastic-fabriek/>

Save Plastics. (2021c). *Safe Tasta huisje render* [Photo]. <https://www.saveplastics.nl/perskit/>

Schubert, C. (2017). Green nudges: Do they work? Are they ethical?. *Ecological Economics*, 132, 329-342.

Sheehan, A. (2019). *How to Promote A Pop-Up Event on Social Media*. Storefront. <https://www.thestorefront.com/mag/how-to-promote-your-pop-up-event-on-social-media/>

Shoeb, M. (2016). Effectiveness of Co-Branding on the buying behaviour of the consumers in retail Sector. *International Journal of Engineering and Technical Research (IJETR)* ISSN: 2321-0869 (O) 2454-4698 (P), Volume-4, Issue-3

Simonse, L. (2017). *Design Roadmapping*. BIS Publishers.

Sun, H., Teh, P. L., & Linton, J. D. (2018). Impact of environmental knowledge and product quality on student attitude toward products with recycled/remanufactured content: Implications for environmental education and green manufacturing. *Business Strategy and the Environment*, 27(7), 935-945.

Swapfiets. (2021). *Swapfiets - Altijd een werkende fiets*. <https://swapfiets.nl/>

Tassoul, M. (2009). *Creative Facilitation* (3rd ed.). Vssd.

The Ellen MacArthur Foundation. (2017). *What is the circular economy?* <https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy>

Trudel, R. (2019). Sustainable consumer behavior. *Consumer psychology review*, 2(1), 85-96.

UKEssays. (November 2018). What is Consumer Behaviour?. Retrieved from <https://www.ukessays.com/essays/business/consumer-behaviour-9815.php?vref=1>

UNESCO. (2015). *Sustainable Development*. <https://en.unesco.org/themes/education-sustainable-development/what-is-esd/sd>

United Nations Environment Programme, GRID Arendal & Behavioural Insights Team (2020). *The Little Book of Green Nudges: 40 Nudges to Spark Sustainable Behaviour on Campus*. Nairobi and Arendal: UNEP and GRID-Arendal.

United Nations General Assembly. (2015, September). *Transforming our World: The 2030 Agenda for Sustainable Development*. United Nations. [https://www.unfpa.org/sites/default/files/resource-pdf/Resolution\\_A\\_RES\\_70\\_1\\_EN.pdf](https://www.unfpa.org/sites/default/files/resource-pdf/Resolution_A_RES_70_1_EN.pdf)

Van Boeijen, A., Daalhuizen, J., & Zijlstra, J. (2020). *Delft Design Guide: Perspectives, Models, Approaches, Methods*. BIS Publishers.

Van Weelden, E., Mugge, R., & Bakker, C. (2016). Paving the way towards circular consumption: exploring consumer acceptance of refurbished mobile phones in the Dutch market. *Journal of Cleaner Production*, 113, 743-754.

Verplanken, B. (2018). Promoting sustainability: Towards a segmentation model of individual and household behaviour and behaviour change. *Sustainable Development*, 26(3), 193-205.

Visser, F. S., Stappers, P. J., Van der Lugt, R., & Sanders, E. B. (2005). Contextmapping: experiences from practice. *CoDesign*, 1(2), 119-149.

Wang, Y., Hazen, B. T., & Mollenkopf, D. A. (2018). Consumer value considerations and adoption of

remanufactured products in closed-loop supply chains. *Industrial Management & Data Systems*.

Wang, Y., Wiegerinck, V., Krikke, H., & Zhang, H. (2013). Understanding the purchase intention towards remanufactured product in closed-loop supply chains: An empirical study in China. *International Journal of Physical Distribution & Logistics Management*.

Weber, E. U. (2017). Breaking cognitive barriers to a sustainable future. *Nature Human Behaviour*, 1(1), 1-2.

12. APPENDIX

12.1. Appendix A: Pressure cooker  
12.1.1. Answers to Instagram poll questions

Are you interested in recycled products in general?	Do you think recycled products bring any risks?	Recycled products can contribute to the protection of the environment
"If it's better for the environment and easy to use then why not!"	"Kan me voorstellen dat er in het recycle-proces dingen mis kunnen gaan. Ligt aan materiaal!"	"but to be honest, recycled products quickly feel to me as a cheap marketing tool. When it's possible to reuse products I'll always favor that over created new products out of used materials"
Would be nice to use circular goods!"	"That the process of creating those cost more energy and other resources"	"Hangt ook van consumentengedrag af. eerste doel moet zijn om überhaupt minder te kopen"
"It's necessary and corporation should take more responsibility in this"	"Recyclen mag geen doel op zich zijn. Het moet wel minder CO2 uitstoot opleveren dan als afval verwerking!"	"Yes and no. it depends on what recycled products are made of what their recycling process is etc."
"Wanneer iets gerecycled is, geeft het me een extra goed/blij gevoel. Ik draag graag bij "	"Risico dat alles met de stempel 'Recycled' meteen goed is voor het milieu, terwijl er ook slechte manieren zijn"	"Definitely! But circular economy has more steps: refuse, reuse, repair.. also interesting :)"
"I'd like to be consuming in a environmentally friendly way"	"de autoriteiten hun regels omtrent verpakkingen zijn streng genoeg zo ver ik weet"	"I would say "THE USE OF recycled products can contribute to..." and not the product itself"
"Milieuvriendelijk"	"Ze zullen de risico's dusdanig minimaal maken anders zouden ze er niet zo veel gebruik van maken"	"It's not so straightforward, but in the best case yes."
"more interested in eco-friendly products who a better for the environment (ipv saranwrap)"	"They bring risk if not done properly, I assume large companies to do this correctly if its an container for edible!"	"Ja, minder plastic soep is beter voor de aarde"
"Because I'm conscious about the limits of our planet and I'm worried"	"Probably.. But couldn't tell you what the risks are"	
"I don't understand why plastic is still a mass production tbh"	"A lot of products end up in the environment and are not recycled or are recycled environmentally unfriendly"	
"Better for the enironment, for the world"	"I think the recycling techniques are created by people smarter than me."	
"Heb het gevoel dat dat bijna altijd al een stuk beter is dan nieuw geproduceerd"	"Omdat bijvoorbeeld het smelten van plastic komt CO2 vrij of er is iets anders niet goed"	
"Great for the environment, but not interested in a recycled 'look' "	"Because they are basically remanufactured"	
Because it's better for the climate, animals people and ofcourse the whole planet"	"There are strict rules to prevent risks"	
"It makes me feel less guilty about my buying behavior"	"Als ze niet goed worden verwerkt. Maar gelukkig is dat zelden!"	
"Die dingen zijn meestal duurder. Als de prijs gelijk is dan heeft dat wel mijn voorkeur"	"I Believe they all have been tested etc!"	
"Because we already have enough products in the world, so if we want to create extra pr"		
"We moeten toch ooit beginnen aan een circulaire economie"		
"Feel less guilty about giving into consumerism"		
"Leuk onderzoek! I want to reduce my footprint"		
"Is good for the environment :)"		

12.1.2. Ideas

Idea 1:  
All the plastic that is used within a company or organization is collected in a special bin. The plastic that is collected will be transformed into something that can be used or placed in the company or organization. In this way a collective awareness is raised (see Figure 61).

Idea 2:  
People can participate in a monthly design challenge and send in ideas in different categories on what to make of local collected plastic. There can be voted on these ideas and the idea that receives the most votes will be made. People can subscribe to receive the product. If the product is not used anymore it can be recycled again. This idea provides a new business model and gives people the opportunity to test products made of recycled plastic in different categories (see Figure 62).

Idea 3:  
Local plastic will be used to pimp a park/plaza or a public space. The population of the neighbourhood can send in ideas to the municipality. The best idea will be executed of recycled plastic. With this idea more awareness and familiarity for products made of recycled plastic is created since it is located in a public space. This is also an opportunity for the municipality to show off their contribution to a greener city and to find a partnership/sponsorship with big companies (see Figure 63).

Idea 4:  
Citizens can send in their ideas to the municipality on what to do with the plastic. The three ideas who received the most votes will be produced as a prototype of recycled plastic and exhibited in a public area of the city. In this way, people can experience the products and vote for their number one. The number one will be manufactured and located in a public area like a park (see Figure 64)

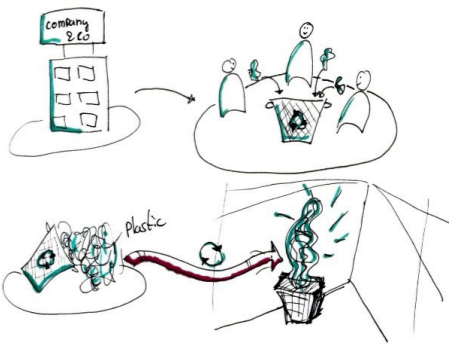


Figure 61:Idea 1 of pressure cooker

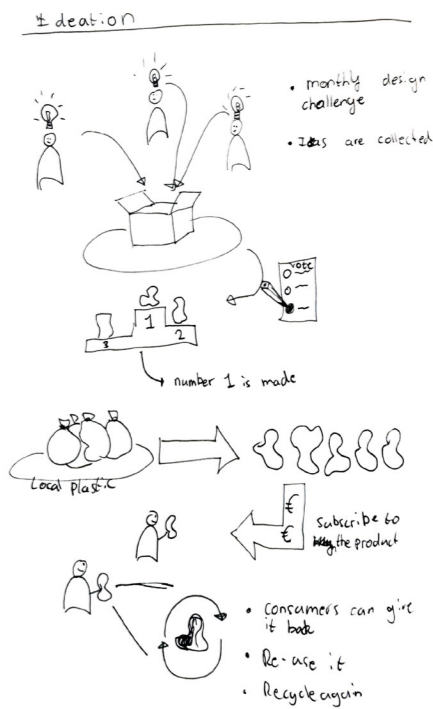


Figure 62:Idea 2 of pressure cooker

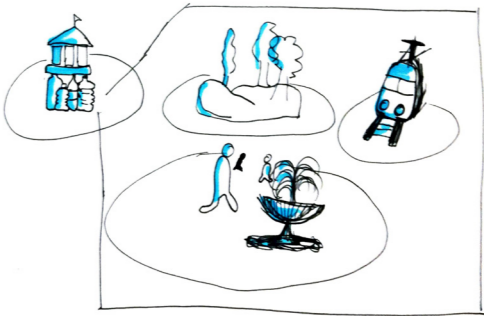


Figure 63:Idea 3 of pressure cooker

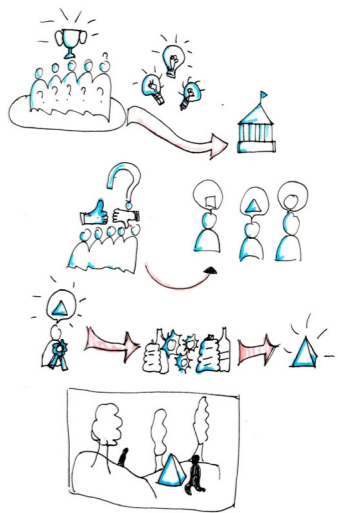


Figure 64:Idea 4 of pressure cooker

12.2. Appendix B: Sensitizing booklet

Name.....'s Booklet about consuming behaviour

Insert a picture of yourself

My name is Your name.....

I am age years old

What is your education?

School: Your school.....

Programme: Your programme.....

Consent form

The interview will be audio/video taped and photographed. These tapes and photos and this booklet will be used for research purposes only. They will not be used commercially.

Please check the statement below, then sign and date. Thank you!

☐

I allow Tara Mengelers to audio/video record and photograph the interview session for research purposes.

Name: Your name.....

Date: Date of today.....

This is what I buy in a day

Keep track on what you buy during a day in this week. This can be anything, for example clothing, a phonecase or a frisbee. Please follow the steps below. First, completely finish step one by writing down all the things you bought during that day before going to step 2. Do the same for step 2 etc. (continued on next page)

Step 1: What did you buy today?  
Write down the things you bought today in the circles on the line on the right.

Type here

Type here

Type here

Type here

Step 2: How did this purchase made you feel?  
Paste one of the emojis below that best matches your feeling when purchasing that thing.

Type here

Type here

Type here

Type here

Step 3: Why did you picked that emoji?  
Explain the reason why you felt that way.

Type here

Type here

Type here

Type here

Step 4: Where did you bought this thing?  
Write down where you bought this thing.

Type here

Type here

Type here

Type here

Step 5: Why did you bought it here?  
Please explain the reason you bought at there.

Type here

Type here

Type here

Type here

Type here

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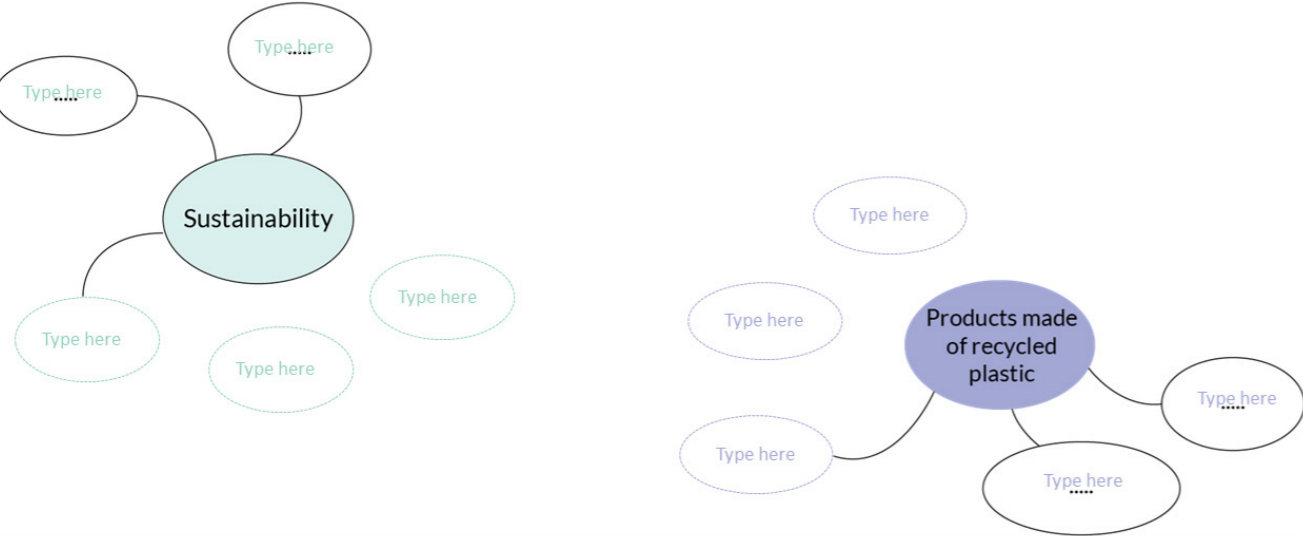
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168

169

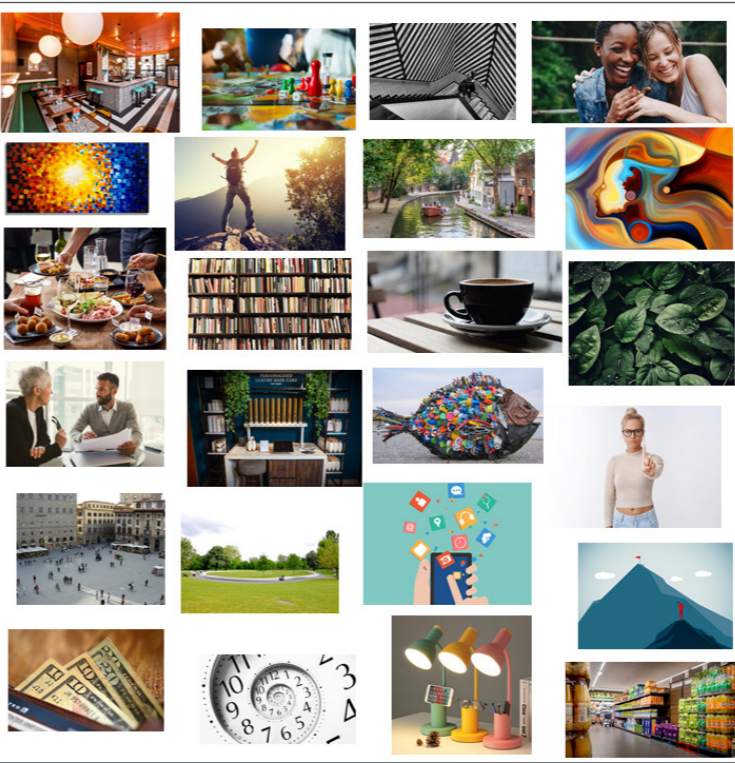
# ● *This is what I am thinking at ...* Write down the associations you have with the following words. You can add more if needed.



# ● *This is how I think of the following statements* Indicate with the dot what matches you best.

	I prefer products made of recycled plastic	<input type="radio"/>	I prefer products made of new plastic	
	I know how a product made of recycled plastic looks like	<input type="radio"/>	I have no clue how to judge if something is made of recycled plastic	
	The environment is top priority in my life	<input type="radio"/>	There are other important things in life	
	I think recycled plastic products are gross!	<input type="radio"/>	Products made of recycled plastic are wonderful and hygienic!	
	I like to show off and impress others	<input type="radio"/>	I don't care what others think of me and my behaviour	

## 12.4. Appendix C: Collage exercise



Demonstrate

Aggressive

Stop

energy

Challenge

overwhelming

Happy

Informative

Awkward

Public

Curious

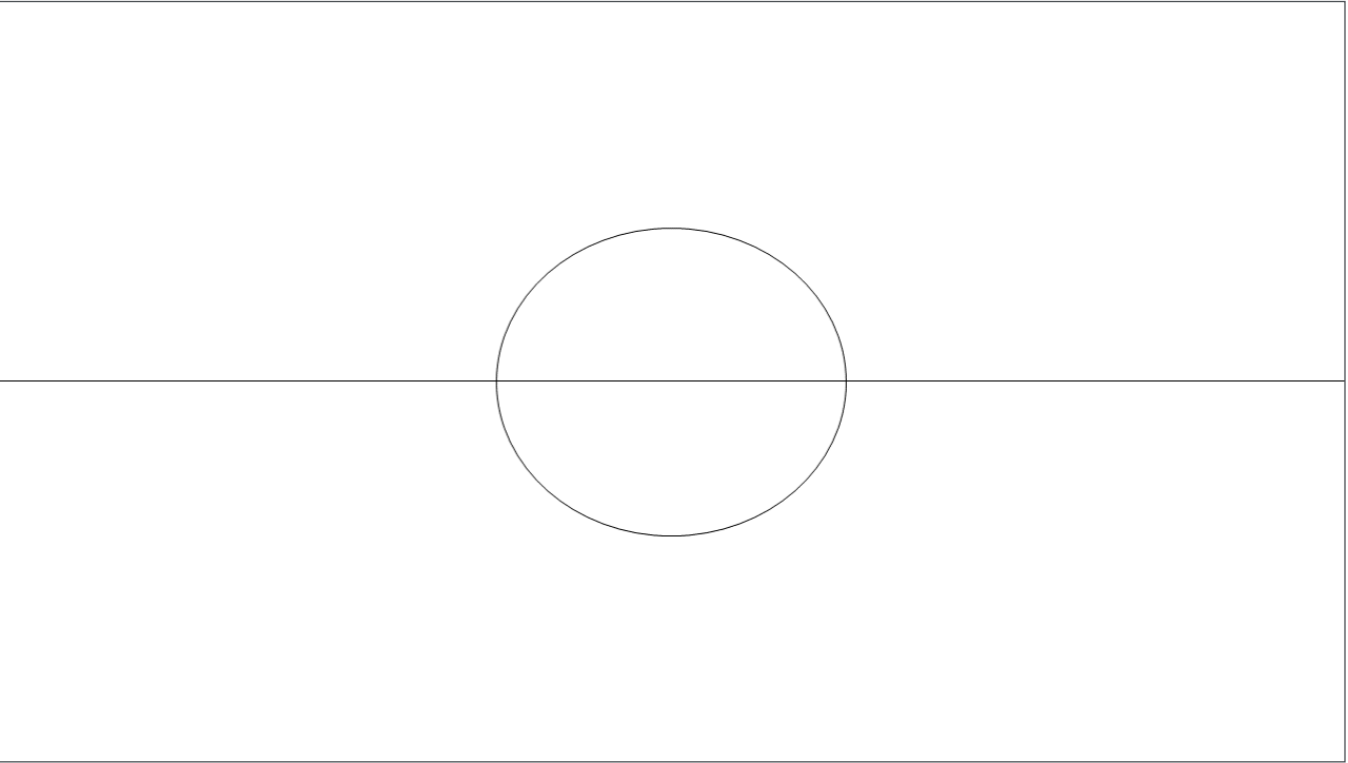
Spark

Self-image

Surprise

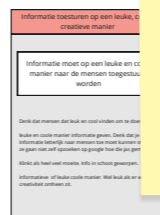
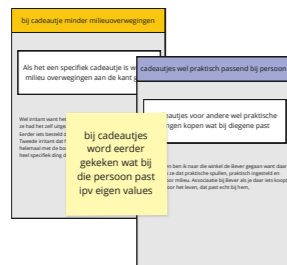
Jealous

Caring





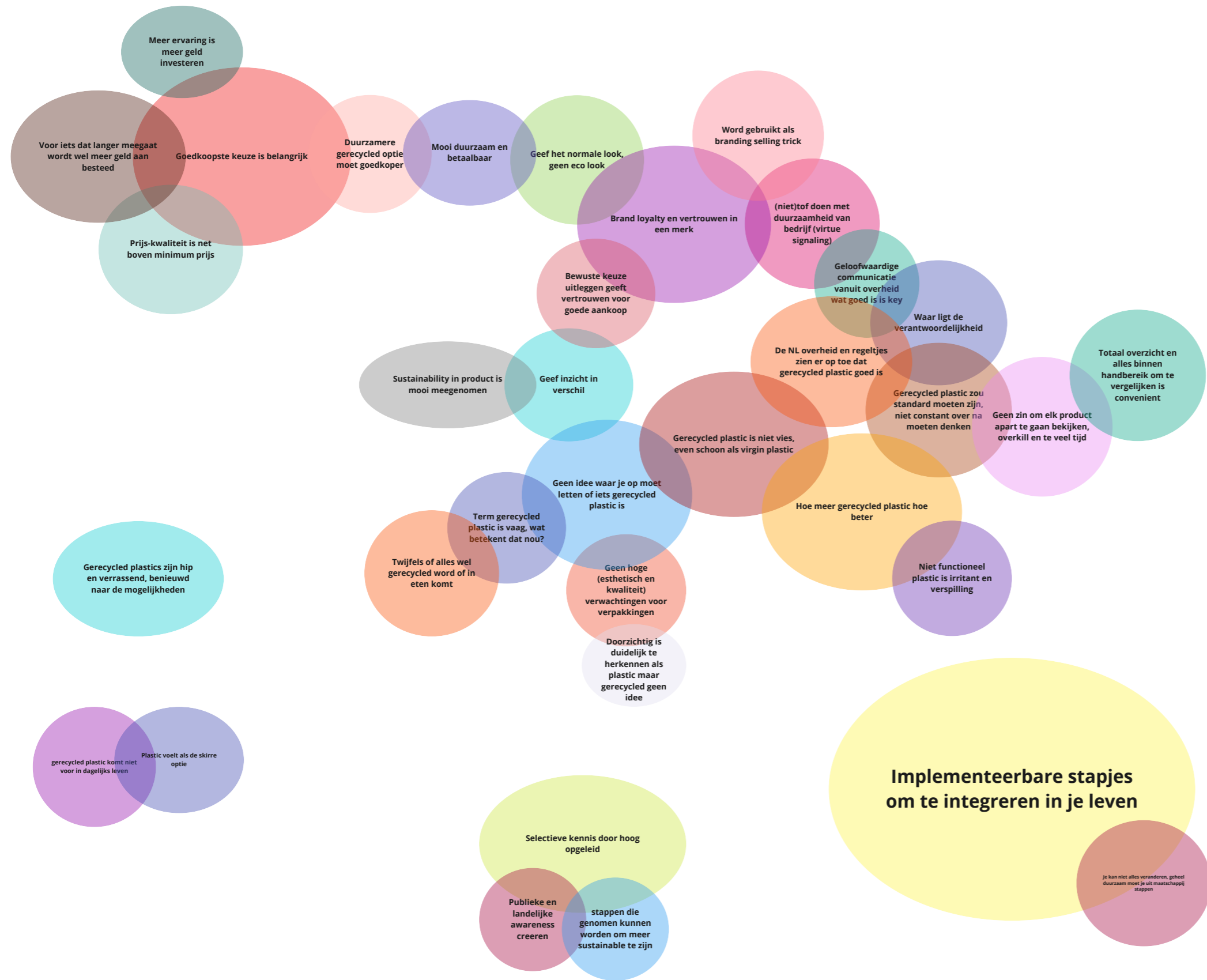




Informatie op een leuke en coole manier naar mensen toesturen



Cluster links



### 12.4.1. Design criteria elements

Important to fit the student context profile:  
The product has to be affordable.

- Using recycled plastic for products students intend to use for a longer time. If recycled plastic is used for products people already intent to use for a longer period of time, this can help to make consumers accept recycled plastic is a good material as well.
- Provide clear steps of how to implement in life, give examples of what people can do
- The social network (friends) can be used to enthuse and inspire
- The sharing of experiences with products made of recycled plastic can work motivating

Elements for the recycled plastic products:  
Spark the curiosity of students with showing the possibilities with recycled plastic

- Use surprising elements
- Make sure they encounter the products in daily life
- Show the differences between a product made of recycle plastic and virgin plastic
- Provide clear information

Design criteria for brands:

- Co-branding products made of recycled plastic with a big familiar brand can help to gain trust in the product and to be perceived as cool
- The communication from the brand should be honest and feel sincere when promoting sustainability or products made of recycled plastic
- Brands shouldn't give a specific "eco" or "recycled" look to the products they produce. They should look just normal.

Design criteria for the government/ municipality

- Using recycled plastic instead of producing new plastic should be the standard, this should be stimulated with incentives.
- The government/municipality can help take away misconceptions by communicating a clear message about recycled plastic. In this way people also encounter it in daily life. Like the BOB-campaign in the Netherlands.

Design criteria for the desired future of students:

- Show an overview of the differences of products made of recycled and virgin plastic
- Make clear what the impact is they can make
- Provide a clear goal
- Make the effect of the behaviour more tangible
- Show on the recycle bin what happens with the collected plastic
- Inform in a cool and fun way
- Students want information, but don't imprint this with logo's on the product. Provide the information as a given when purchasing. For example with a small tag or by telling them.
- The students would like to experience and feel the product, so some sort of demonstration can work to experience it
- Provide the overview at a glance/ eyesight. For example with a dedicated section in the shop.

### 12.5. Appendix F: Ideation



Figure 65: Enlarged version of H2 brainstorm of ideation phase

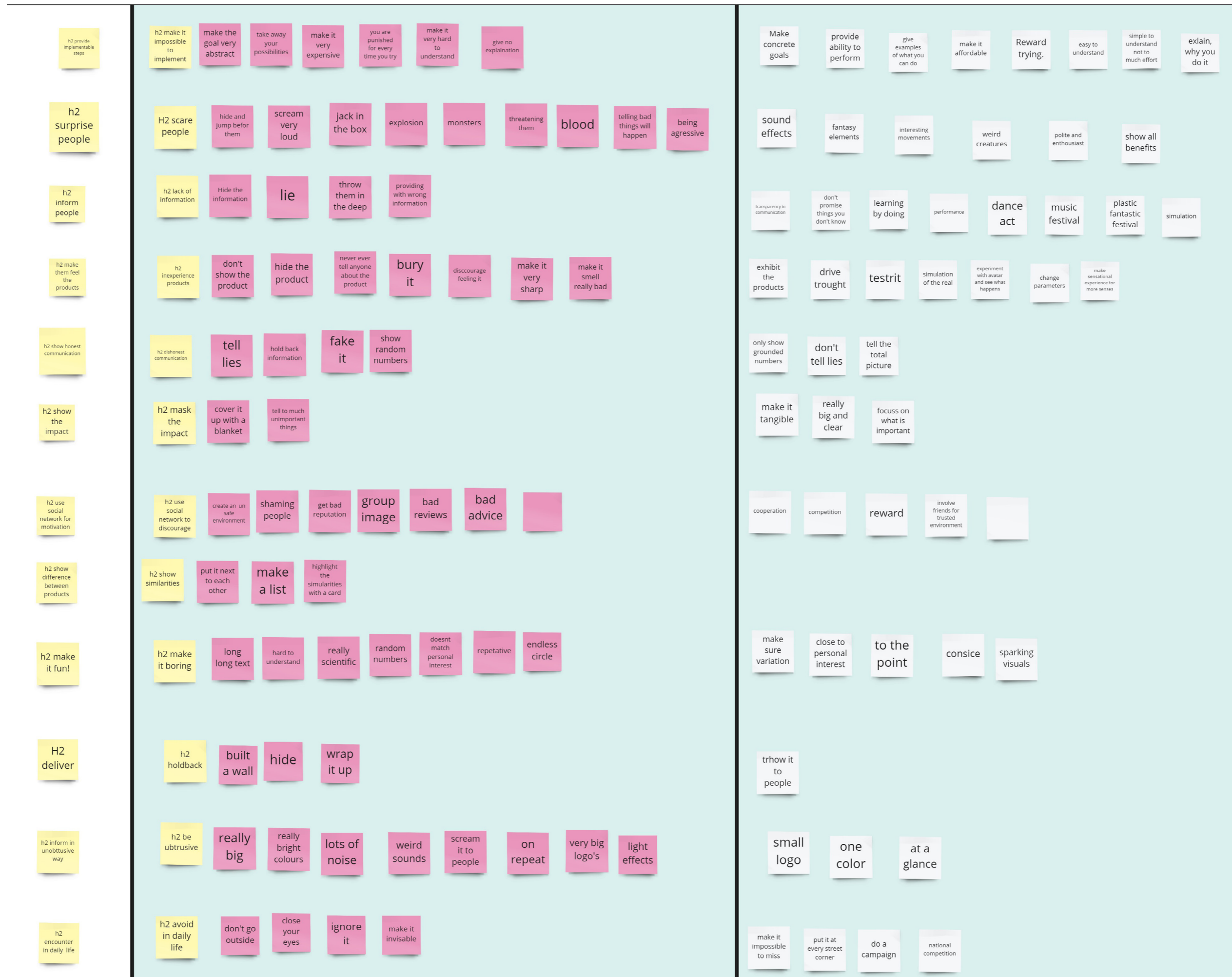


Figure 66: Enlarged version of reversed brainstorm

12.6. Appendix G: Project brief

DESIGN  
FOR our  
future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

**USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT**  
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according to the format "IDE Master Graduation Project Brief\_familyname\_firstname\_studentnumber\_dd-mm-yyyy". Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name Mengelters

initials T given name Tara

student number \_\_\_\_\_

street & no. \_\_\_\_\_

zipcode & city \_\_\_\_\_

country \_\_\_\_\_

phone \_\_\_\_\_

email \_\_\_\_\_

Your master programme (only select the options that apply to you):

IDE master(s): ☐ IPD ☐ Dfl ☒ SPD

2<sup>nd</sup> non-IDE master: \_\_\_\_\_

individual programme: - - (give date of approval)

honours programme: ☐ Honours Programme Master

specialisation / annotation: ☐ Medisign

☐ Tech. in Sustainable Design

☐ Entrepreneurship

SUPERVISORY TEAM \*\*

Fill in the required data for the supervisory team members. Please check the instructions on the right !

\*\* chair Ruth Mugge dept. / section: IDE-DOS, MCR

\*\* mentor Athanasios Polyportis dept. / section: IDE-DOS, MOD

2<sup>nd</sup> mentor \_\_\_\_\_

organisation: \_\_\_\_\_

city: \_\_\_\_\_ country: \_\_\_\_\_

comments (optional)  
The members of my team have a different background and therefore a different contribution. Dr. Polyportis has a marketing background, whereas dr. Mugge has a design background.

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v.

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

TU Delft

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Ruth Mugge date - - signature \_\_\_\_\_

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: \_\_\_\_\_ EC

Of which, taking the conditional requirements into account, can be part of the exam programme \_\_\_\_\_ EC

List of electives obtained before the third semester without approval of the BoE

☒ YES all 1<sup>st</sup> year master courses passed

☐ NO missing 1<sup>st</sup> year master courses are:

name \_\_\_\_\_ date - - signature \_\_\_\_\_

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked \*\*. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?

Is the level of the project challenging enough for a MSc IDE graduating student?

Is the project expected to be doable within 100 working days/20 weeks ?

Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: ☐ APPROVED ☐ NOT APPROVED

Procedure: ☐ APPROVED ☐ NOT APPROVED

comments

name \_\_\_\_\_ date - - signature \_\_\_\_\_

Consumers' acceptance of products made of recycled plastics

project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date01 - 03 - 2021

23 - 07 - 2021end date

INTRODUCTION \*\*

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Sustainability is a big topic of discussion these days. Every year, around 1,3 million kilos of household waste is produced in the Netherlands. A large part ends up in nature and this is not beneficial for the environment. Recycling plastics can help to reduce the amount of waste that ends up in nature. It is the process of transforming waste plastic materials into new objects and materials. It can help reduce the amount of raw 'virgin' plastic that is produced. In order to reduce the environmental impact it is important to improve the reuse of "waste" resources.

The European Interreg TRANSFORM-CE project does design research on how to increase the recycling rate of single use plastics and how to increase the uptake of recycled plastics by consumers and businesses.

Increasing the demand of recycled plastics is important to obtain viable business models, but products made of recycled plastics are only successful if consumers are willing to adopt these kind of products. Therefore the consumers' acceptance of products made of recycled plastics is important (Calvo-Porral & Lévy-Mangin, 2020). Right now there is a gap between the attitude and the actual behaviour towards purchasing recycled products. Consumers show a high purchase intention, but they fail to engage in the actual purchase of the products (Park&Lin, 2018).

There are some factors found that have an influence on this intention. For example the perceived safety (Calvo-Porral & Lévy-Mangin, 2020) or the perceived quality of the product made of recycled plastics compared to a product made of "virgin" materials". Literature shows that consumers are willing to purchase sustainable products if they believe that they have the same qualities and functions as the products made of these virgin materials (Magnier et al., 2019).

Also, it is interesting to see that although there is an attitude-behaviour gap, consumers' evaluation of products made of ocean plastics is generally positive and that a part is willing to pay a premium price for it (Magnier et al., 2019). Further, community influence has a positive correlation with the decision of purchasing recycled-from-plastic-waste fashion products (Nguyen et al., 2020).

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introduction (continued): space for images



image / figure 1: The game Jenga made of recycled plastics from fishing nets by a collaboration of Bureo and Jenga



image / figure 2: Bar furniture made of recycled plastics by Replas

## PROBLEM DEFINITION \*\*

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

To reduce the environmental impact, the uptake of recycled plastics by businesses and consumers needs to be enhanced.  
On the one hand, the problem is that there is not enough demand of recycled plastics by businesses. It is not seen as a valuable resource to exploit as the processing of recycled plastics costs more than virgin materials (Bucknall, 2020).  
On the other hand, products made of recycled plastic are only successful if consumers are willing to adopt these kind of products. Therefore, the acceptance of these products by consumers is important. Right now there is a gap between the purchase intention and the actual purchase of the product. (Park & Lin, 2018).

The problem is that plastics are perceived to have little value (Bucknall, 2020) and that consumers see risks in products made of recycled plastics. They perceive the products as less safe compared to products made of "new" materials. (Sun et al., 2018) Also consumers perceive environmentally greener products automatically as being of lower quality, regardless the price (Newman et al., 2014).  
Also, there is a lack of familiarity with the use of recycled plastic materials in products. This is associated to the lack of knowledge or concern over product functionality and performance of a consumer (Essoussi & Linton, 2010). For a better appreciation of recycled plastics, education of everyone in our society is required to address the lack of knowledge (Bucknall, 2020)

Therefore it is important to research why consumers perceive products made of recycled plastics as less value and how to increase the knowledge about these products. These insights can be used for designing strategies towards consumers acceptance of products made of recycled plastics in order to increase the demand and uptake of recycled plastics.

## ASSIGNMENT \*\*

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... . In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Designing a strategy/toolkit to increase the acceptance of products made of recycled plastics to stimulate the intention behaviour of purchasing environmental products for different consumer types. For this I have to research what factors are important for determining the intention and why consumers perceive products made of recycled plastics as less. What are the barriers of consumers right now? Also I will examine if different consumer segments/types can be identified

## PLANNING AND APPROACH \*\*

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 1 - 3 - 2021 23 - 7 - 2021 end date



To kick-off my graduation project I will start with a pressure cooker of one week, in which I do a full project in one week. The aim of this is to get some first orientation and understanding of the problem and the solution space. After this, I will continue with desk research. The aim of this step is to do more in depth research on the current situation and to identify the important topics (focus) for the interviews. In the investigate step, I want to apply contextmapping interviewing techniques to discover the latent needs and experiences of consumers

The next step is to analyse the interviews and identify the key insights. These insights are used to define the fitting framework/persona's/design opportunities. This framework will be used as input for ideating the right strategies. During this generate step, I want to facilitate a creative workshop/co-creation session to brainstorm and generate ideas and concepts towards consumers' acceptance of products made of recycled plastic.

After this the goal is to converge and choose/combine concepts. This new concept will be prototyped and evaluated upon in order to make iterations. This eventually leads to the final design of the strategy/toolkit.

In between the steps I want to spent time to reflect on the steps and write parts of the report, so I don't have to do this in the end of my project.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... . Stick to no more than five ambitions.

With this project I want to prove that I am able to conduct qualitative design research to map out the context and translate this into design opportunities/strategies to stimulate behaviour change in people. I am really interested in the psychology behind certain choices of people and therefore really enthusiast to dive into the what makes people accept products made of recycled plastics or not. Also I hope that with this project I can contribute a bit in tackling the environmental problems.

During my elective space I followed the elective Context Mapping Skills and I experienced that context mapping is a really interesting way to discover all the different layers of motivations and behaviours of people in order to understand them. Therefore I want to practice context mapping in my project as well. I want to learn how to set up sensitizing materials interviews and use the insights to make persona's or design opportunities. This can be used as basis for the strategies.

Also I want to facilitate a creative session/co-creation workshop to generate ideas and concepts for strategies. I want to practice this as it is a bit out of my comfort zone and I believe it is a great valuable part of a designer to be able to organize workshops and bringing people together.

Another thing I want to work on in my graduation project are my visualization skills. I think visualization skills are very important and valuable for communication and telling the right story. Also I think it can help me to externalize my thoughts and create overview. Therefore I want to force myself to work more visual and use these to iterate upon.

Lastly, if there is the right opportunity, I want to make use of persuasive, playful elements as I believe that playing can be a natural way of stimulating and motivating behaviour change. Also it can be used to make problems visible and achieve communication. Therefore it would be nice if I can include gamification in my strategies as well, but only if this fits the solution.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

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Initials & Name T Mengelers Student number 4383516

Title of Project Consumers' acceptance of products made of recycled plastics