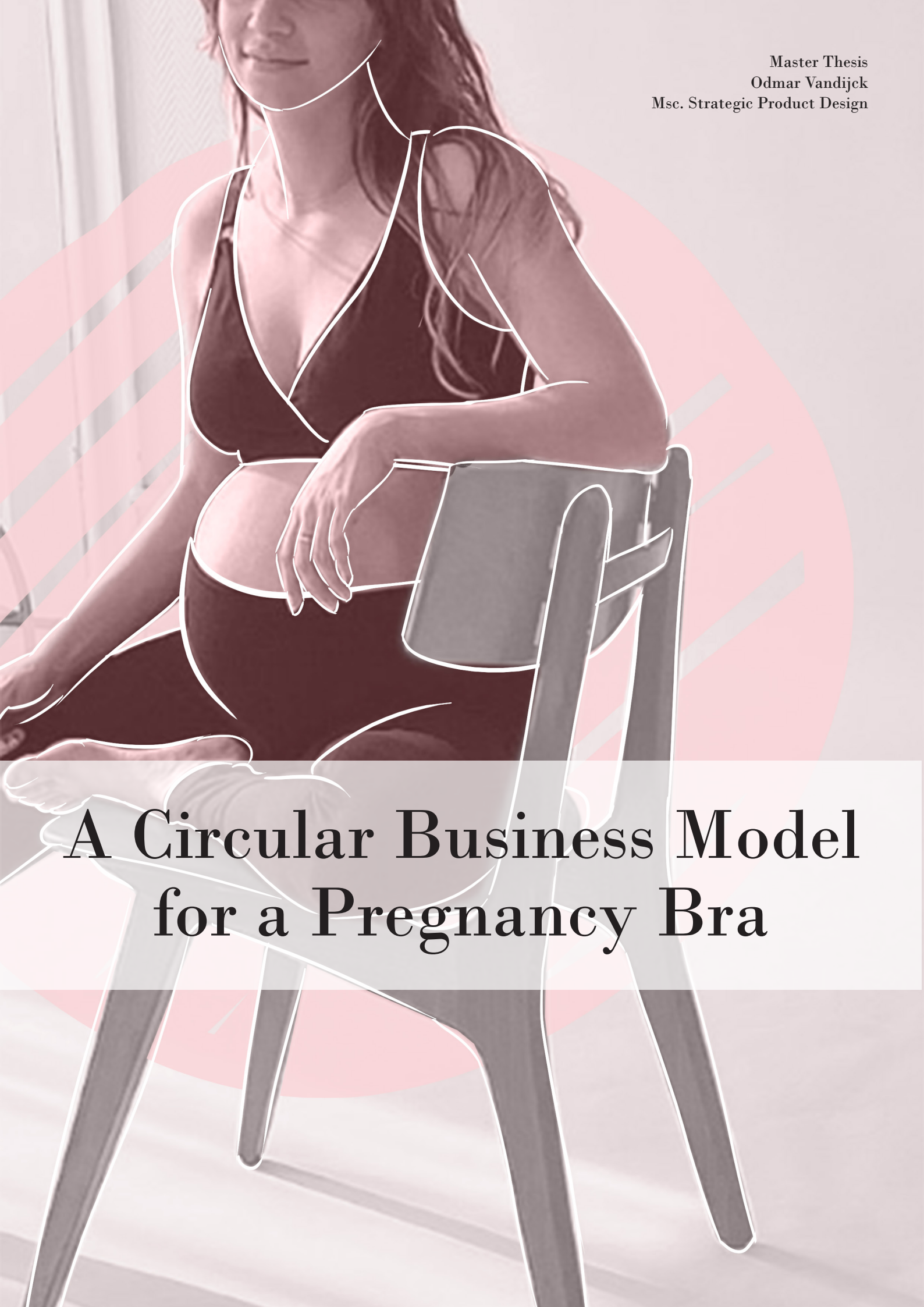
Master Thesis
Odmar Vandijck
Msc. Strategic Product Design



A Circular Business Model for a Pregnancy Bra

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Designing a circular business model for the pregnancy bra by Feelou
Master Thesis
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Author
Odmar Vandijck
Msc. Strategic Product Design
Faculty of Industrial Design Engineering
Delft University of Technology

Supervisory team
Dr. ir. E.A. van den Hende (chair)
Prof. dr. ir. J.M.L. van Engelen (mentor)
Msc. N.M. Figdor (Feelou)

Preface

This is my master thesis, the culmination of everything I learned at the TU Delft and beyond that. Ever since I was a child, I was interested in repairing products and seeing how they worked. Realising this was not only interesting, but also necessary to keep our planet livable, got me started in learning about sustainability. In learning about that, circular economy specifically sparked my interest. Through industrial design, my knowledge expanded somewhat to the social domain: a product not designed with the customer in mind is a product that nobody would buy.

It is with this interest that I got started on this thesis. As I am a male without children, it was especially interesting to me to design for pregnant women in this project. Furthermore, it turned out that my passion for industrial design is not lying in product design. To create a truly circular economy, product service systems need to be designed that take all stakeholders and processes throughout the whole lifecycle of products in mind. As the design of the Feelou pregnancy bra was almost complete, I could focus this thesis on the service side of this product service system.

Altogether, this thesis has been an interesting challenge in circular design for me. Even though it took me longer than expected to finish this thesis, mostly due to a broken arm halfway through the project, I can surely say that I am happy with the result I can present to you here. This would not have been possible without the help of my coaches for this project, Ellis van den Hende and Jo van Engelen. They were always willing to help me through my struggles and doubts: Thank you both very much for your support.

Also a big thanks to Noor Figdor for the opportunity to do my thesis for Feelou. It has been very inspiring to see Feelou grow towards the product launch. Seeing how a startup deals with the challenges it is presented with and helping to solve some of them was fun!

Finally, I want to thank all my friends and family for giving me that little push or spark of inspiration whenever I needed it. You were also a good source of distraction when I needed to take my mind off the project to come back later with a fresh mind.

I look forward to further challenges in the future, hoping to contribute to a world that gets a little better every day.

Odmar Vandijck

Summary

This report proposes a strategy to develop a circular business model for Feelou, a company that has worked on a sustainable pregnancy bra. The circular business model aims to improve the lifespan of the bra and reduce resource usage. This report consists of a research phase and a conceptualisation phase. The research phase explores the current industry and the challenges for the resource flows in the circular business model. The conceptualisation phase aims to solve the challenges that are found in the research phase, resulting in a roadmap for development of a circular business model.

The main challenges for a sustainable company in the current clothing industry are competing with greenwashing companies and finding sustainable alternatives for currently common practices, as the industry is a long way from becoming sustainable. Three paradoxes describe the dilemmas that Feelou faces in launching a circular business model for their bra.

Firstly, the Business model paradox shows that a sales model would be easier for Feelou and the customer. However, it would be less sustainable than a lease model, in which Feelou would keep ownership of the product. Secondly, the Perceived hygiene paradox is an important challenge for the reuse of bras: many women find pre-loved bras unappealing, however this is influenced by familiarity with the previous owner. Finally, the Circular impact paradox considers the scale versus quality of impact. Doing it perfectly mostly means doing it on a smaller scale, which affects overall impact. To grow, concessions need to be made.

The Butterfly Diagram (figure 1) inspired the Resource flow diagram (RFD), a model that was used to explore possibilities for a circular business model (figure 2). The analysis showed that Feelou should focus on the inner loops as this is where Feelou has a direct influence. The main challenge in the inner loops lies in the Perceived hygiene paradox. As a lease model creates many additional challenges, a sales model is pursued in the conceptualisation phase.

The conceptualisation phase started with a co-creation session with the target group. Many solutions were provided by the participants, noteworthy findings include: accompanying the product by a letter that describes the ideal life cycle of the bra, emphasising the value of sustainable behaviour as the reward itself and a focus on positive communication.

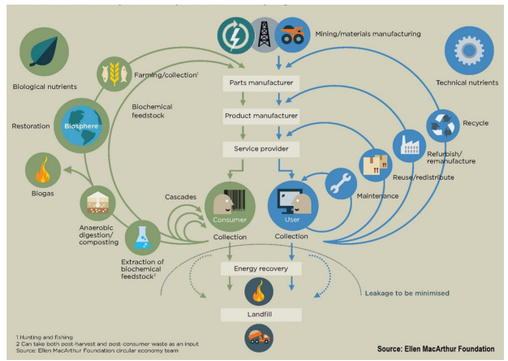

Figure 1: The Butterfly Diagram by the Ellen McArthur Foundation.(Ellen MacArthur Foundation, 2013)

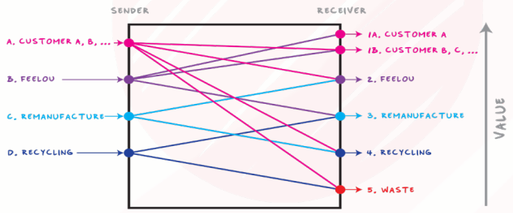

Figure 2: The Resource flow model that resulted from exploration of the circular business model.

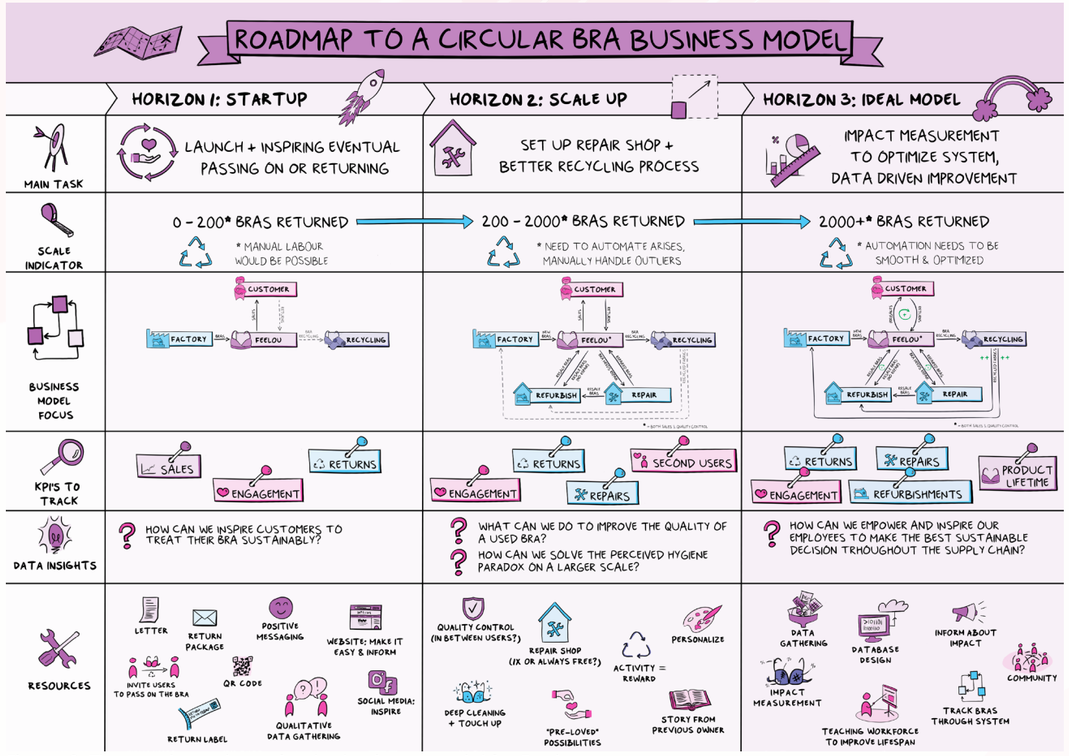

Figure 3: The roadmap to a circular business model for Feelou.

The RFD exploration and brainstorm provided enough material to fill in the service blueprint, providing an overview of the circular business model and its components. An interesting insight of the service blueprint is that Feelou can inspire customers to treat the bra sustainably on three different moments: during sale, during use and after use.

The business model canvas provided insight into the main challenge for the selection of the target group and value proposition: the dual focus on comfort and sustainability in the branding of Feelou. Further exploration through the brand DNA shows that this dual focus actually provides a competitive advantage. The comfort aspect focuses on the individual, while the sustainability aspect focuses on society and the planet, resulting in a branding strategy that is more resilient than comfort or sustainability alone would be.

The final deliverable, a roadmap (figure 3, page 46-47), helps to put all ideas and sides of the circular business model into perspective over time. It splits the development into the startup phase, the scale up phase and finally the ideal model. It provides a toolbox of resources that can be used to set up the circular business model and let it grow towards the next phase.

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1. Research phase

1.1 Introduction

The clothing industry is a major strain on the planet, both in carbon emissions and water usage (Niinimäki et al., 2020). For example, this industry alone is responsible for 10% of human carbon emissions (McFall-Johnson, 2020). Therefore, we need to improve resource efficiency within this sector. The EU adds pressure to this by passing legislation to force the clothing industry to become more sustainable by 2030 (Webb, 2022). Feelou, the client, found an area that has a lot of room for improvement: maternity bras. By fundamentally redesigning the bra system, they aim for a positive impact in this product category.

Each year, 165.000 women get pregnant in the Netherlands (CBS, 2019a). These women buy multiple bras during their pregnancy, as their sizes continually change. They constantly need to look for better fitting bras, as most bras are made for just one size and one purpose. Not only is buying multiple bras expensive and unsustainable, finding the right bras surrounding pregnancy also causes a lot of unnecessary stress during an already stressful time.

Feelou aims to develop a bra that can change according to the needs of the female body. By redesigning the way the bra is fastened, it is possible to use the Feelou bra for multiple cup sizes and circumferences. This is essential during pregnancy, as these sizes change during and after pregnancy and regular bras do not offer enough size variability. Therefore, women need to buy multiple regular bras during pregnancy as previous ones do not fit anymore. With the Feelou bra, only one size can be worn during the whole pregnancy. This increases comfort during use, but also reduces the stress of buying new bras. Comfort was an important topic in designing the product and was discussed elaborately within the pilots.

Feelou also aims to reuse and recycle their products after they become obsolete for the first user. In this way, their bras take into account both the human side and the planetary boundaries. These two dimensions have been broadly discussed as important for sustainable development (Steffen et al, 2015, Raworth, 2017). With this project, Feelou aims to accompany the bra they designed with a fitting circular business model.

1.2 Design brief

The design brief asks for a circular (re-) design of the Feelou bra and the service system it lives in (appendix A). The goal of this circular redesign is to extend the lifespan of the bra, therefore reducing resource use. Here it is important to have a clear definition of "circular". In this project, circularity will be defined by looking at the Circular Economy Principles (Bocken et al, 2016) and the Butterfly Diagram (Ellen MacArthur Foundation, 2013, figure 4). These principles are:

- *Close the loops:* Design out waste.
- *Slow down the loops:* Increase lifespan of products.
- *Inner loops are prefered over outer loops:* Rather reuse than remanufacture products and rather remanufacture than recycle them.

Instead of just selling the bras, which would be a linear business model, Feelou will aim for a circular business model. This means that a product service system (PSS) will be necessary with services for the loops a bra can go through before recycling. The PSS of Feelou consists of many parts that all have to be researched to gain an overview. After understanding the system, it can be redesigned with optimised circular value. A circular PSS is successful if it applies Circular Economy Principles and therefore offers a more sustainable alternative to products in the current linear economy.

As the scope of redesigning a complete PSS was too broad for a graduation project, it was decided that the focus would lie on the business model of the bra, thus focussing on the service system. (Re-) designing both the service system and the product would broaden the scope too much because balancing these two components and their interactions would increase the complexity of the project substantially. As the product has already had a lot of feedback through customer interviews, it was decided that there was more to gain from designing the business model for this project.

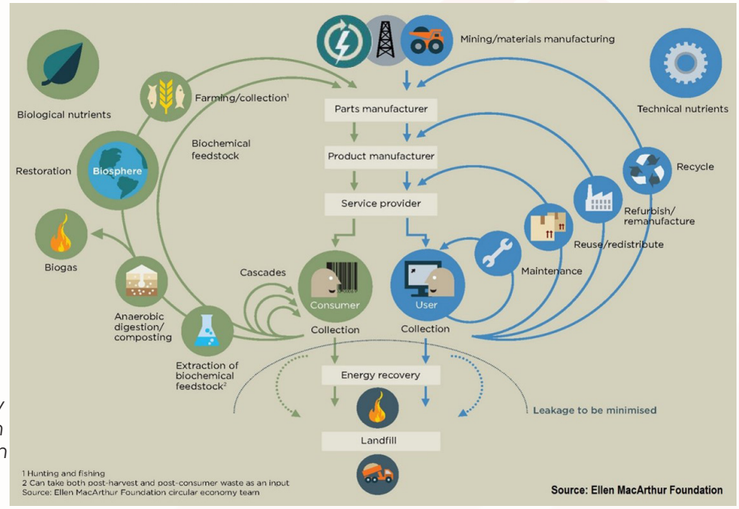


Figure 4: The Butterfly Diagram by the Ellen McArthur Foundation (Ellen MacArthur Foundation, 2013).

1.3 Problem exploration

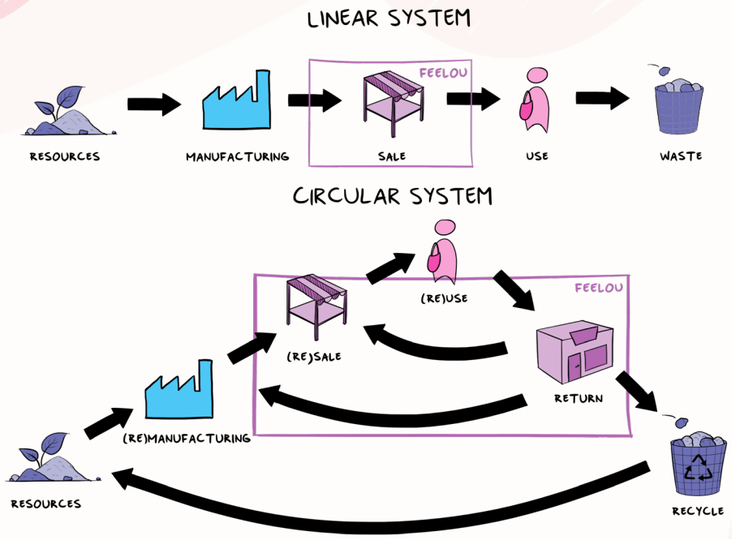


Figure 5: Visual of a linear system (top) and circular system (bottom) for Feelou, as extracted from the Butterfly Diagram.

System exploration

To get an overview of all parts of the lifecycle of the Feelou bra, the Butterfly Diagram was used as a template and both a linear and circular version of the system were drawn to look at all components (figure 5). These visuals provide an overview of the system that exists already (for instance the Feelou sales channel) and components that could be the result of this project, for instance product recovery and quality control.

The initial system sketches revealed that closing the loop required more research into the current recycling systems available in the clothing industry. Also, looking into current sustainable innovations in the clothing industry could provide examples that open up more possibilities than just improving the recycling program. Some mind maps were made to gain an overview of questions that needed to be researched (appendix B). Therefore, the clothing industry needed to be looked at from different perspectives:

The clothing industry as a whole

- What is the status quo of sustainability within the clothing industry?
- What happens when clothes are discarded by owners? Can they be recycled?
- Do consumers buy second-hand clothing?

The most innovative companies

- What are the main sustainable innovations within the clothing industry?
- What are successful business models that sustainable companies use?

The customer mindset

- How do innovators and the majority look at sustainability in the clothing industry?
- What are the differences between these consumer types?

Clothing industry

There are two conflicting trends going on in the fashion industry. On the one hand, fast-fashion accelerates collections and causes more resources to be used and more clothes to be discarded that are "not fashionable" anymore, resulting in a doubling of resources consumed by the industry (Niinimäki et al., 2020). Big companies like H&M and Zara are responsible for this and claim that they are becoming more sustainable by, for instance, using cotton that is grown with less pesticides (DW Planet A, 2021, jan 8).

However, on the other hand, brands are noticing the demand for more sustainable options and adapting their supply chain to meet this demand (Bloomberg Quicktake: Originals, 2021, dec 10). Furthermore, the second hand market is growing for both low end and high end consumers (Bloomberg Quicktake: Originals, 2021, nov 26). Finally, more knowledge is accumulating about measuring the impact of sustainable consumer behaviour within the fashion industry (Change Inc., 2022, feb 14).

Innovative companies

Within the fashion industry, some noteworthy companies are working on sustainable business models (Koszewska, 2018). For instance, Mud Jeans has a lease model for jeans. They do also sell jeans and after leasing for a year, the customer gets to keep the jeans if they want. Another example is the Salvation Army, who are working hard on innovations surrounding the reuse and recycling of discarded clothing (Salvation Army ReShare, n.d.). The clothing they receive gets sorted according to quality and clothing that cannot be sold again, goes through a recycling program. However, product materials are often hard to determine, which makes the recycling process inefficient and only partly circular.

Many companies improve the sustainability of their production processes and resource use, within the clothing industry examples of these companies can be found anywhere. These processes mostly aim at organic and/or recycled materials, less water usage and finally, material innovation (Muthu, 2014): some companies use cactus leather or leather made from fruits like apple or pineapple (SAYE) and there is much innovation in bamboo based materials. Other sustainable materials include organic cotton and organic hemp, or synthetic materials like recycled polyester and recycled nylon (Batista, 2022). A high quality fabric that is often used for underwear is (TENCEL) Modal, which can be sustainably sourced from wood. TENCEL Modal is made by Lenzing, a company often named in lists of sustainable materials for their transparent and sustainable production processes.

Customer mindset

Sustainable consumer behaviour can be improved by focussing on the social value in disposing of clothes sustainably (Soyer & Dittrich, 2021). Ability to recycle also plays an important role, which is shown in the business model framework from Tunn et al (2019). Here, customer effort was prefered to be lower for a successful circular business model. If this business model is a lease contract, it is important that the product is perceived as clean and of good quality (Tunn et al, 2021).

Another big challenge in the clothing industry is greenwashing. In the fashion industry, production processes and supply chains are often opaque, which can be a sign of unsustainable practices. This negatively affects customers' attitude towards sustainable fashion (Rausch & Kopplin, 2021). To prevent greenwashing, companies should communicate the sustainability of their clothing clearly. As each consumer and company interprets sustainable clothing differently, different claims attract different customers. Sometimes, certain assumptions about sustainability can even negatively impact it as durability might be seen as more important than the sustainability of the materials of a product (Jacobs et al., 2018).

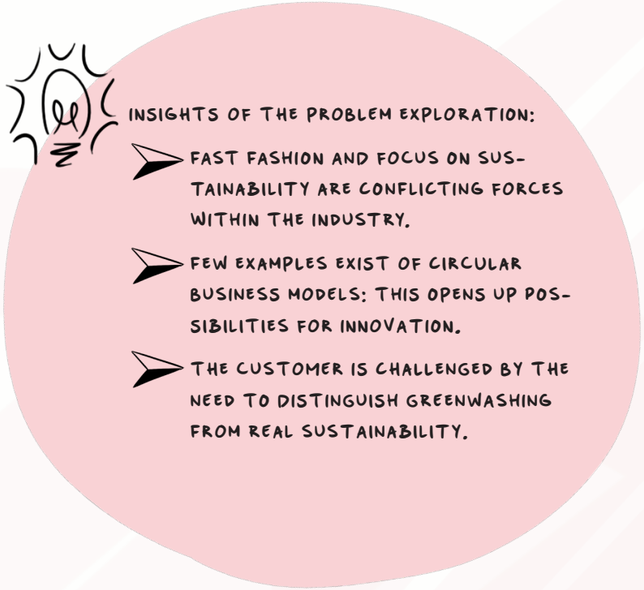
Also, the definition of sustainable clothing itself might lead to confusion. Some claim that clothes should be made without plastic because it reduces microplastics in the environment, while others prefer recycled clothes because that is better than clothing made from virgin materials. Then there are people that say that organic materials are worse because resource efficiency per land area is reduced and there are many more of these seemingly contradictory sustainability claims. These choices lead to paralysis, which can negatively impact consumer behaviour (Longo et al., 2019).

Finally, reducing their environmental impact is just one type of goal for consumers. There are also consumers that are more concerned with their social image or that find pleasure-seeking more important than making a positive impact with their consumer behaviour (McNeill & Moore, 2015). These are all very subjective choices and this makes the process of choosing the right brand or piece of clothing hard for consumers.

Conclusion

With their bra, Feelou aims to position themselves as a sustainable alternative to regular bra retailers. Feelou does this not only with sustainable materials, but also by redesigning the bra to reduce the amount of bras needed during and after pregnancy. By exploring PSS options and adopting circular economy principles, their positive impact can be increased even further.

As this chapter shows, there is much room for circular innovation in the clothing industry. However, only having a sustainable business model is not enough to convince customers that Feelou is sustainable, as many companies use greenwashing to appear more sustainable than they are. Therefore, the main challenge lies in developing a circular business model while convincing the customer that Feelous alternative is really making an impact.



1.4 Resource flow exploration

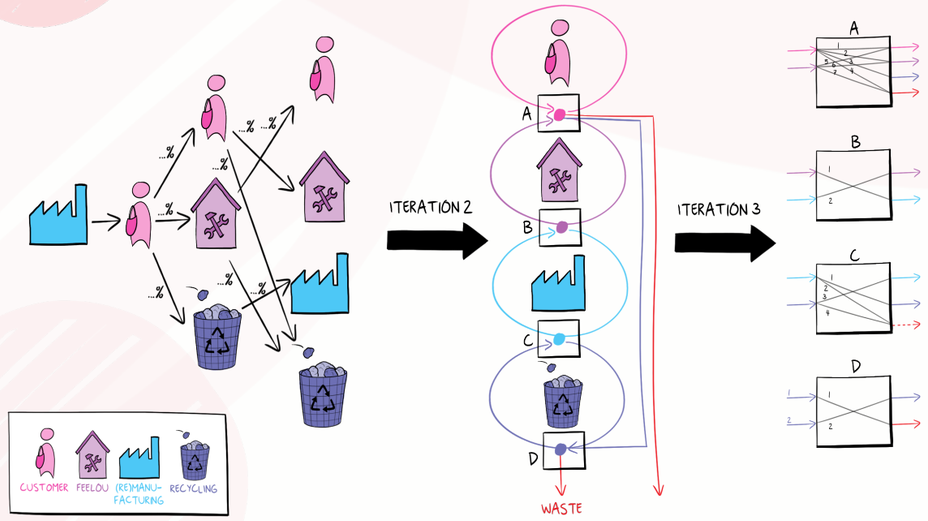


Figure 6: Process of the resource flow exploration.

Introduction

With a better understanding of the fashion industry and its consumers, the circular business model for Feelou can be explored. To understand the resource flows within the Feelou system, earlier system sketches inspired by the Butterfly Diagram were iterated further. Within the Butterfly Diagram, resource flows are arrows between the stakeholders (or nodes) in the system. Examples of resources are for instance products, product parts or materials. In the Butterfly Diagram, the context of the nodes shows what a resource flow consists of. Therefore, the flows are not named but the nodes are. For instance, a return site does not provide recycled materials as it is not the recycling plant (however, they might be close to each other if this provides more value to the system). Also, you would never sell raw resources to a customer, only final products. To explore the PSS of Feelou, the flow of resources needs to be explored and mapped. This was done in the following paragraphs.

Process

This paragraph explains the process leading up to the final resource flow visualisation, this makes understanding the final visual easier. The resource flow was explored by mapping options for the product at every stakeholder in the system. However, this made the visual unclear as stakeholders would appear in different places. Therefore a circular adaptation was made. The full process can be seen in figure 6.

In the circular diagram, the highest value of resources is in the customer loop, and the value gets lower if resources loop lower, with the lowest value for waste generated from the system (the red arrow). This corresponds to the value of loops in the Butterfly diagram, so inner loops become the higher loops and outer loops the lower ones. Therefore, the "inner loops > outer loops" principle is transformed into "higher loops > lower loops". The other two principles stay the same in this circular diagram of the resource flows.

By extracting the nodes of this circular diagram, a square could be drawn with incoming and outgoing resource flows. Between squares some stakeholders were still mentioned multiple times, so as a final step the squares were merged and this resulted in the final resource flow diagram (figure 7). The outgoing resource flow is similar to the incoming flow in the next step: if step 1 has an outgoing flow to Feelou, step 2 starts at Feelou as the incoming flow. In the resource flow diagram, the "higher loops > lower loops" principle still holds true, as the stakeholders can still be ranked within the square.

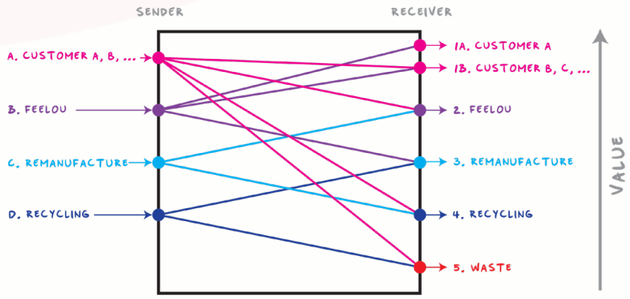


Figure 7: Final resource flow diagram visual with all resource flows mapped.

Use of the diagram

An important note to the final resource flow diagram, is that the stakeholders (nodes) and resource flows (links) are undefined. The context of specific nodes and links defines what they are. The node named "B. Feelou" has a link going to "a1. Customer A", but also to "a2. Customer B, C, ..". The link that goes to a1 consists of new products, while the link going to a2 consists of pre-owned products. Similarly, "C. (Re-)manufacture" can be the factory that new bras are made in, but also a different workshop that sends repaired/ refurbished bras to Feelou.

The resource flow diagram is a theoretical abstraction from the Butterfly Diagram that is more specific to the clothing industry. At this stage, the circular business model has not been designed yet, so multiple options are left open. However, this diagram provides a clear framework to analyse the stakeholders and resource flows, which will be done in chapter 1.6 (Resource flow analysis).

Conclusion

This chapter discusses the process leading up to the resource flow diagram, an adaptation from the Butterfly Diagram that provides a framework to look at the resource system of Feelou. In the ideal world, products would always stay in the highest loops of the resource flow diagram. In practice, the value of products and resources deteriorate for numerous reasons and they quickly end up in waste. The Butterfly mainly uses sustainable values like energy and material input and aims to reduce those impacts. However, making higher resource flows in the resource flow diagram attractive for customers and Feelou requires looking at other forms of value creation. These will be discussed in the next chapter.

INSIGHTS OF THE RESOURCE FLOW EXPLORATION:

- THE RESOURCE FLOW DIAGRAM (RFD) PROVIDES A CLEAR OVERVIEW OF ALL THE STAKEHOLDERS (NODES) AND RESOURCE FLOWS (LINKS) IN THE FEELOU SYSTEM.
- SUSTAINABLE VALUE IS HIGHER FOR HIGHER NODES AND LINKS IN THE RFD.
- THE CONCEPT OF VALUE NEEDS TO BE EXPLORED FURTHER TO FULLY UNDERSTAND FEELOU AND CUSTOMER INCENTIVES FOR ADOPTING HIGHER NODES AND LINKS.

1.5 Value of the pregnancy bra

During the creation of the RFD value was mainly defined as sustainable value, because the RFD is an adaptation from the Butterfly Diagram. However, value can be defined in many ways and can be different for different stakeholders. Different forms of value can also be conflicting, which results in a system that is far from the ideal circular business model. The main ways value can be measured in this project are:

- *Circular value:* The more circular the product, the more sustainable the system as a whole. As mentioned in the design brief, circularity is defined as applying the circular principles.
- *Monetary value:* The money a product is worth for the customer, but also the money that is invested by Feelou, both affect the price that is paid for a product. Feelou as a company needs revenue to exist, so this value is the basis of compromises that need to be made for the circular value.
- *Emotional value:* The value of a product can be influenced by emotions, making it worth more for one person than another. Positive or negative emotions can arise from the brand, presentation of the product, service experience, recommendations from friends etc. This can significantly impact product attachment and monetary value of a product.
- *(Perceived) hygienic value:* For a second user, the perception of hygiene is a major factor in deciding whether they would use a "pre-loved" (recycled) product. This can be independent from actual hygiene of the product, as discovered in the interviews (appendix C).

The interactions of these values have an important effect on balancing the circular business model. To become more circular, exponentially more investment is needed, while the customer only wants to pay up to a certain amount extra for increased sustainability (figure 7, left). On the other hand, the more emotional value a product has, the better its circularity as the customer often holds on to the product for longer and the lifetime is extended. This emotional value is increased by increasing the perceived hygiene, as customers find the product more attractive (figure 7, right).

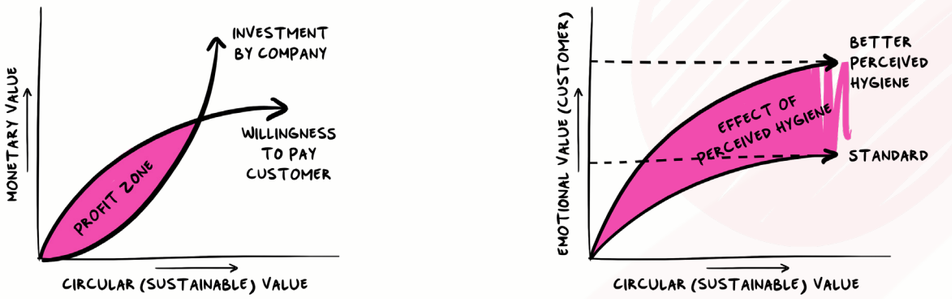


Figure 7: Relationship between monetary and circular value (left), and between emotional and circular value (right).

Business model paradox

To get a better sense of what the business model could look like, a mindmap was made with the two main options and their characteristics: A sales model and a subscription or lease model (appendix D). With this mindmap, another important paradox surfaced: the sales model is less effort for the customer (emotional value), but the subscription model could be prefered for the environment (figure 8). In a subscription model, the company has ownership of the product and handles the End-of-Life phase. Therefore more possibilities open up for circular resource treatment (circular value). The decision between a sales model and a subscription model could affect the lifetime of the product, as customers tend to treat products that are not their own worse.

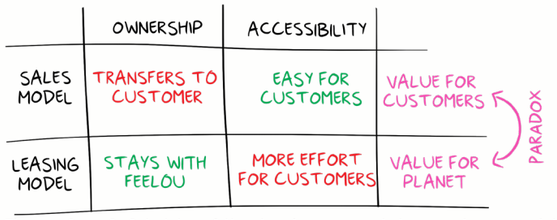


Figure 8: A 2x2 table of the business model paradox considering both the sales model and the lease model.

Customers could also be more used to buying clothes than leasing them, resulting in more sold products and more revenue in a sales model (monetary value). Together with the ease of transaction that lowers the customer effort in a sales model considerably (Tunn et al., 2019). This means that selling a subscription model to customers will require an extra effort from Feelou.

On the other hand, a subscription model also means the ownership of the bra stays with Feelou. This makes it more likely that the bra will be treated sustainably between users and after its value for customers has depleted, because handling the products in bulk provides a homogenous resource stream from known materials. This makes it much easier to recycle (circular value). In a sales system, Feelou would need to put in an extra effort to motivate customers to return their bras. The efforts, impact and costs of maintaining a circular lease system against a sales model with incentivised product returns need to be weighed to decide which model would fit best.

In the business model paradox, the interaction of conflicting values clearly shows that an ideal circular business model according to circular values is challenging. The aim of this project was to explore possibilities for a circular business model for Feelou and extend the lifetime of products within the Feelou system. However, to create a viable business model, the (theoretically) higher circular value of the subscription model has to be weighed against monetary value for Feelou and emotional value for customers, which could make a sales model more fitting.

Perceived hygiene paradox

If a product is new, it is perceived as clean. A used product can be industrially cleaned and reach the same level of hygiene as a new product. However, this used product will never be perceived as clean as the new product (perceived hygienic value). This is especially true for bras, as they are underwear and thus worn very close to intimate regions of the body (Meng & Leary, 2019). This paradox makes it a challenge to sell used bras in a second-hand market (See quote #1).

It is worth noting that several interviews (both previously by Feelou and within this project, quote #2 and #3) showed that people would be more open to using second-hand bras if they would come from someone they knew, for instance family members or friends (appendix C). This could be seen as a factor contributing to increased emotional value. Hypothetically, they would be willing to consider using a second-hand bra from someone they just met once if that person was perceived as tidy, however more precise parameters should be researched to discover what would be sufficiently "tidy". Letting customers pass on the product within their own circle of family members and friends might be a first step in solving this paradox. Figure 9 shows how the perceived hygiene can be increased by emotional factors such as knowing the previous owner. This figure looks similar to figure 7, as emotional value and perceived hygienic value are closely related.

The value for Feelou of solving this paradox lies in unlocking the upper part of the resource flow diagram, reuse by a second customer. This would be the highest circular value that can be achieved for a used bra. If the perceived hygienic value rises by increasing emotional value, a customer might also be willing to pay more and monetary value could be increased. In conclusion, solving the perceived hygienic paradox should be a priority for Feelou, because it enables the highest possible circular value.

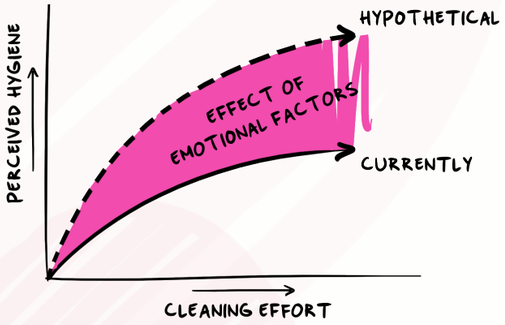


Figure 9: The effect of perceived hygiene on the effort needed to clean/refurbish the product sufficiently for resale.

Circular impact paradox

Recycling vs life extension

Bloomberg discussed that Eastern-European and African countries are more willing to use second hand clothing, which results in a massive stream of used clothes being shipped towards these countries, where these products get a second life (Bloomberg Quicktake: Originals, 2021, nov 26). However, after this second life, clothes end up worse than they would have in a Western-Europe country because the recycling facilities in Western-European countries are better. In Eastern-European countries, many clothes would end up in a landfill or being incinerated.

The systemic sketch of the product lifespan (figure 10) shows this dilemma of the circular value. This dilemma shows a conflict in the circular principles "Slowing the loop" (extending the lifespan) and "Closing the loop" (improve recycling rate). When used bras are returned to Feelou, finding the right path for them is important in increasing circular value.

Impact quality vs scale

Additionally, there is a balance between the quality and scale of impact. A small company that is 100% circular can have a much lower impact than a multinational with a recycling program for 1% of its sold clothes (figure 11). Therefore, growth should always be balanced against improving sustainability. Growth could also enable better sustainability by generating revenue. Finally, reaching more customers could also inspire them to be more sustainable in other areas of their lives, which increases impact even further.

This is a balance between circular value and monetary value. On the one hand, Feelou aims to have a big impact through a circular business model (circular value), but on the other hand, the bigger impact may lie more in scale than in quality, requiring growth and investment (monetary value).

The Circular impact paradox shows the conflict that arises when the theory of circular principles and circular value is put into practice. There, geography can play a big role in sustainable treatment of products and focusing on growth can eventually be more valuable than focusing on increasing circular value, as both quality and scale impact the circular value of the business model.

Conclusion

The three paradoxes show how circular value interacts with other values. From these interactions, some challenges arise for Feelou that need to be addressed to create a circular business model. The Business model paradox provides a dilemma between the sales and subscription model, where ownership impacts the circular value of the business model. To improve the highest loop of the resource flow diagram, reuse, Feelou needs to solve the Perceived hygiene paradox. Finally, the Circular impact paradox shows that geography, scale and quality can all have an impact on the circular value of the business model. In the next chapter (resource flow analysis), these paradoxes show important conflicts in some of the resource flows. These conflicts complicate the higher resource flows and provide a challenge in increasing circular value.

Quotes:
1. "Of ik koop op marktplaats. Met bh's zou ik dat toch een beetje smerig vinden dat er borstvoeding in gezeten heeft. Maar als iemand hem maar een paar x heeft gedragen en met het kaartje eraan ofzo vind ik het wel ok." ~Roos, Prototype test #3 (21-01-2022)
2. "Ik wissel bh's en zwangerschapskleding uit met mijn vriendinnengroep. De bh's die ik de vorige zwangerschap heb gekocht liggen nu bij een andere vriendin." ~Danja, Prototype test #3 (06-01-2022)
3. Conversations with family: Adinda, Stephanie and Nathalie (sisters) all said they would not be willing to wear a second-hand bra, except when it came from family or friends. In the hypothetical scenario of taking a bra from someone they did not know, they reacted that that person should look tidy.

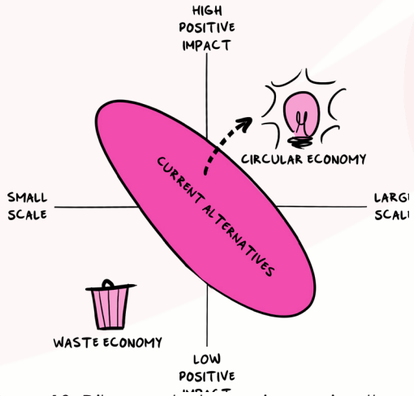


Figure 10: Dilemma between increasing the lifespan or improving the recycling rate.

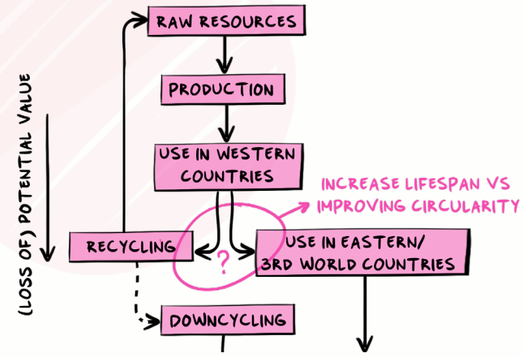


Figure 11: Impact quality vs impact scale.

INSIGHTS OF THE VALUE EXPLORATION:

- CIRCULAR VALUE IS JUST ONE OF THE MANY CONFLICTING VALUES WHEN CONSIDERING THE CIRCULAR BUSINESS MODEL.
- THE BUSINESS MODEL PARADOX SHOWS THAT A SALES MODEL IS MORE VIABLE, WHILE A SUBSCRIPTION MODEL (THEORETICALLY) HAS A HIGHER CIRCULAR VALUE.
- THE PERCEIVED HYGIENE PARADOX IS A CONFLICT BETWEEN ACTUAL AND PERCEIVED HYGIENE, RESULTING IN LOWER REUSE OF BRAS SPECIFICALLY.
- THE CIRCULAR IMPACT PARADOX SHOWS CONFLICTS THAT ARISE WHEN CREATING A CIRCULAR BUSINESS MODEL: GEOGRAPHY, SCALE AND QUALITY CAN ALL IMPACT THE CIRCULAR VALUE.

1.6 Resource flow analysis

Introduction

The resource flow exploration resulted in a systemic visualisation of all resource flows in the system (figure 13 & chapter 1.4). This model reduces redundancy and clarifies which flows each node has. This chapter will go deeper into each resource flow and discusses solutions to optimise them. First, the system boundaries will be explored.

Then each node on the left side will be discussed from top to bottom, with considerations for all resource flows coming out of that node. As the resource flow diagram (RFD) is an overview of the complete theoretical system, this provides an overview of every stakeholder and resource flow in the system and the possibilities and challenges that arise when optimising the system.

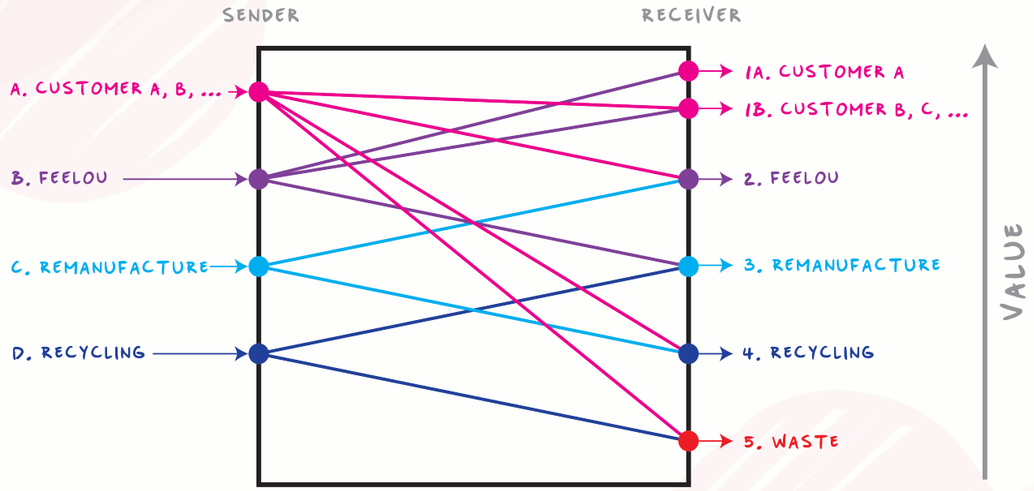


Figure 13: Final system visualisation (Resource flow diagram).

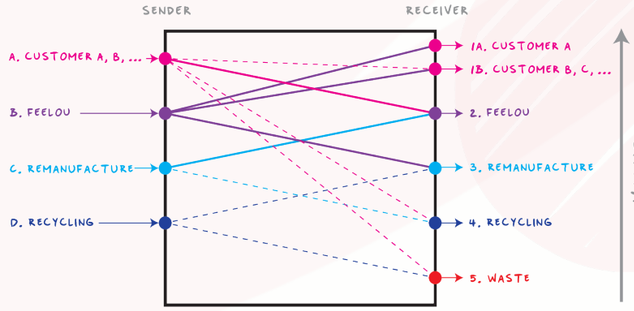


Figure 14: Feelou system boundaries.

Feelou system boundaries

Once all resource flows within the bra system had been mapped, it became possible to look at each flow individually or in clusters. The first cluster of flows is shown in figure 14. This shows all resource flows that Feelou directly interacts with, therefore they are easy to measure and Feelou has a relatively high degree of control over them. The dotted lines represent flows that happen without the direct influence of Feelou. These might be harder to measure, which complicates impact measurement. However, they are still part of the Feelou impact and they should be measured as accurately as possible. Especially the flows that come after the first user could significantly impact the circularity of the system, but are hard to control for Feelou.

Customer flows

As noticed in the system boundaries, what happens to the bra after the first user has a big impact on the circularity of the system. The four flows that come from the customer node (figure 15) will be discussed in this chapter, with the considerations concerning the decision between a sales and a subscription model.

Lease versus sales model

The customer flows depend on the ownership of the bra. If a sales business model is used, the customer can do whatever they want with the bra after the usephase. With this model, Feelou can only make certain decisions more attractive for the customer than others. However, with a lease model, Feelou would have much more influence over where the bras end up after customers no longer want or need them. Figure 16 shows all resource flows the customer can choose from after the usephase. The columns show the difference between the lease model and the sales model. The flows are discussed further in the next chapters.

Flow 1: Passing on the bra to a second user (A>1B, 1C, etc.)

Both with a lease and sales model, the "pass on"-flow (flow A>1 in figure 15 & 16) provides a design challenge. This flow would always be preferable over flow 2 (return to Feelou), as it is a guarantee that the bra will get a second life. With flow 2, Feelou needs to put in an extra effort to set up a return process, and even then it is still questionable the bra will get a second life, considering the Perceived hygiene paradox discussed in chapter 1.5. Therefore,

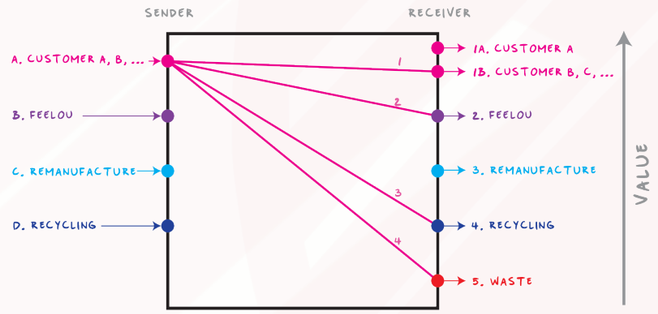


Figure 15: Customer options in the RFD.

Figure 16: All flows for the customer mapped with both business model options.

RESOURCE FLOW \ BUSINESS MODEL (BM)	OWNERSHIP: FEELOU (BM: LEASE)	OWNERSHIP: CUSTOMER (BM: SALES)
1. A TO 1, PASS ON TO NEXT USER	BOTH A AND 1 SHOULD BENEFIT FROM THIS TRANSACTION, AND IT SHOULD BE PROFITABLE FOR FEELOU.	CAN FEELOU PROVIDE A PASSIVE INCENTIVE TO DO THIS WITHOUT COMPROMISING OPTION 2? IF THERE IS A REWARD, HOW CAN FEELOU CONFIRM THAT THE PRODUCT IS ACTUALLY PASSED ON?
2. A TO 2, RETURN TO FEELOU	DEFAULT ROUTE IF NO 1B IS FOUND.	CASHBACK WOULD BE THE OBVIOUS CHOICE HERE, BUT THAT MIGHT DECREASE THE LIFESPAN (PEOPLE MIGHT USE THE PRODUCT LONGER IF THERE'S NO CASHBACK.)
3. A TO 4, RECYCLE THE BRA	X	X WASTE STREAM: PLASTIC/ CLOTHING RECYCLING? SALVATION ARMY ETC.? NOT SURE IF THIS IS REALISTIC.
4. A TO 5, THROW AWAY THE BRA (NO VALUE CAPTURE)	X	DEFAULT ROUTE IF NO BETTER ALTERNATIVE IS PROVIDED (MIGHT TAKE A WHILE IF THE BRA ENDS UP IN A CLOSET).

THERE'S ONLY 2 TYPES OF OWNERSHIP, SO THERE ARE NO OTHER OPTIONS THAN A LEASE OR A SALES MODEL.

CONSUMER WASTE MOSTLY ENDS UP IN LANDFILL OR AN INCINERATOR: THIS NEEDS TO BE PREVENTED IF POSSIBLE.

passing on is preferable over returning to Feelou. It extends the lifetime of the bra significantly and simultaneously saves a bra (or multiple bras) from being produced for the second user. If Feelou invests in stimulating customers to pass on their used bras, it can improve the brand image of Feelou as an honest and sustainable brand. This can in turn increase sales to customers that find these values important.

When discussing the option of passing on a bra in the interviews, perceived hygiene did indeed prove to be a problem. However, as the interviewees were conscious this was different from the actual hygiene of the product, they would consider using a second-hand bra if it would come from someone they knew, for instance a family member or friend (appendix C). This can open up possibilities for dealing with the Perceived hygiene paradox.

Flow 2: Returning the bra (A>2)

In the lease model, flow 2 would be considered a default route. If flow 1 is not possible, the bra will always return to Feelou, as it is still owned by Feelou. However in the sales model, increasing this flow would require an extra effort from the customer over flow 3 and 4. It is more work to send back the bra to Feelou compared to throwing it away or putting it in a recycling bin that is available around the corner. To make flow 2 attractive for customers, Feelou would have to give something in return or make it attractive in another way.

Flow 3 & 4: Recycling (A>4) and waste (A>5)

Flow 3 and 4 only exist in the sales model, and would probably be the most used flows if Feelou does not make the other flows more attractive. Normally, people throw away their clothing if they consider it worn out. Some might be recycled properly, but much will end up in incineration or landfill anyway.

If customers have a particularly sustainable mindset or are hopeful about clothing reuse, they might bring their clothes to the Salvation Army. Whether the Salvation army accepts bras to resell, should be researched further (email contact bore no response). They do have recycling programs to handle anything that cannot be sold again. However, these programs are not completely circular as much of the clothing is downcycled. Furthermore, many clothes are made with various synthetic materials that are hard to recycle.

These considerations show why a lease model would be beneficial to a sales model in terms of sustainability. In a lease model, flow 3 and 4 are not even available for consumers, providing Feelou with much more control over where their bras end up after use. A sales model would only give Feelou the power to nudge customers into the right direction, while a lease model lets Feelou take control over the end of life phase.

Figure 18: All options for Feelou mapped with both the sales and lease business model.

RESOURCE FLOW \ BUSINESS MODEL (BM)	BM: SALE, OWNERSHIP TRANSFER TO CUSTOMER	BM: LEASE, OWNERSHIP STAYS WITH FEELOU
1. B TO 1A, FIRST USER	SALE: CUSTOMER IS USED TO THIS TYPE OF TRANSACTION.	LEASE: MORE EFFORT TO ATTRACT CUSTOMERS.
2. B TO 1B, SECOND USER AND FURTHER	SALE: CUSTOMER DOESN'T WANT TO USE SECOND HAND UNDERWEAR, EVEN IF IT'S INDUSTRIALLY CLEANED (ASSUMPTION, MAYBE	X LEASE: IF OPTION 1 AND OPTION 2 FOR BM SALE MAKE IT HARD TO FIND CUSTOMERS, THIS WOULD BE IMPOSSIBLE. FIRST SOLVE THE OTHER 2 CHALLENGES.
3. B TO 3, QUALITY CONTROL AND/OR RECYCLE	ALL PRODUCTS THAT ARE RETURNED BY CUSTOMERS GO THROUGH QUALITY CONTROL.	

FEEDBACK FROM FEELOU: IS LEASE POSSIBLE WITHOUT PUTTING PRESSURE ON THE CUSTOMER TO END THE SUBSCRIPTION EARLIER THAN IDEAL?

Decision on sales versus lease model

Even though these advantages could make it worth releasing a lease model in the future, it was decided to focus this project on the sales model, as finding second users is currently a challenge. A lease model would be useful if multiple people would use the product, but for just one product per user the increased effort of finding customers and the increased complexity of the business model would not be worth it. Later in this project, a Q&A with Mudjeans (appendix F) provided similar arguments.

Feelou flows

In this theoretical system, Feelou acts as a hub between the customer and back-end processes considering production, refurbishment, repair etc (figure 17). Therefore, the main flows out of the Feelou node either go to customers or to the producer. In this analysis, the producer can be the manufacturer or the refurbishment/repair workshop, as no concrete design decisions have been made for the system. This chapter will discuss these possibilities further.

Incoming resource flows

There are two flows coming into the Feelou node. The first are new products, coming directly from the manufacturer. These all go the same route, namely B>1A (figure 17). The second stream is more complex, as these are used products. Here, the correct flow is decided based on the quality of the used products and whether Feelou can find customers for their used products, so there needs to be a quality control step in this system. This quality could be improved if Feelou implements a refurbishment/remanufacture step in their system. An overview of options is shown in figure 18.

Flow 1: First sale or lease (B>1A)

All bras going through this flow are new. There is demand for this flow, as customers are used to buying new products. Challenges in selling these bras are similar to any new product that needs to be sold. As discussed at the end of the customer options, a sales model will be assumed for now as the challenges for a lease model

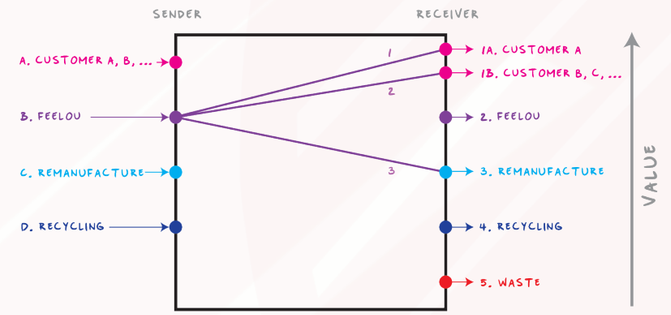


Figure 17: Feelou options in the RFD.

were considered too complex in combination with those existing already.

Flow 2: Second life (B>1B)

Products that are returned to Feelou after use, need a quality control that decides whether they can be reused immediately or after a small refurbishment. If this is not possible, the bra would go through flow 3. The bra could also go to someone known to the first user if Feelou acts as an intermediary between node A and 1B, for instance by refurbishing a bra before it gets sent to the next user. As shown in the Perceived hygiene paradox (Chapter 1.5), it would be much easier if customer A knows customer 1B. In flow 2, the used bra could also be sent to the Western-European market, which is currently common for used clothes.

In Eastern-European and African countries people are much more willing to use pre owned products as they want to look fashionable and follow western standards, and used clothes are much more accessible to them (Konno & Cherim, 2019). Feelou could set up a market for pre owned bras there, but further research needs to be done to find out whether this would be a desirable product for these markets, assuming that enough bras are returned and considered reusable. In this case, the Circular impact paradox discussed in chapter 1.5 should be kept in mind here: the quality of recycling should be balanced against the scale of the impact.

Flow 3: Remanufacturing (B>3) or recycling (B>4)

In an ideal system, if reuse is not possible and a remanufacturing system is in place, Feelou should send the used bras to the remanufacturing system (Flow 3, B>3). In turn, the remanufacturing system would decide whether it can remanufacture the bra or it needs to be sent to the recycling plant, cascading it further downwards.

If the remanufacturing system does not exist (yet), Feelou could send the bras to a recycling plant (B>4). This would be the starting point of the system as Feelou is a startup and there is no system in place yet. If a sales model is chosen, getting people to return their used bras at all might be such a challenge that a refurbishment system would only be possible in the future. Thus, the initial focus of developing the circular business model should lie in stimulating second users and returns. The roadmap (chapter 2.6) will discuss the order of development further.

(Re)manufacturing

This part considers node C (figure 19), Remanufacture in the resource flow diagram. It might be preferable to fuse manufacturing and remanufacturing, as this would mean one workshop with spare parts instead of two different sites. Here, both recycled and virgin material come in to produce new bras, but there would also be parts available to remanufacture used bras.

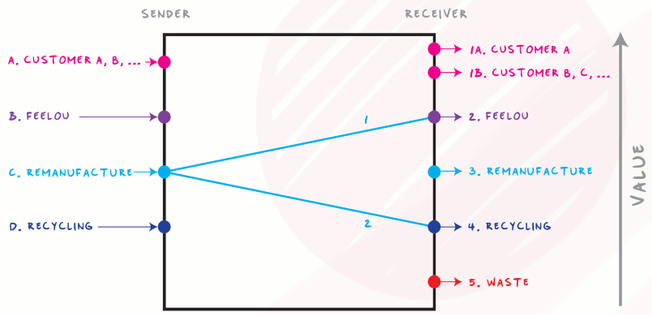


Figure 19: (Re)manufacturing in the RFD.

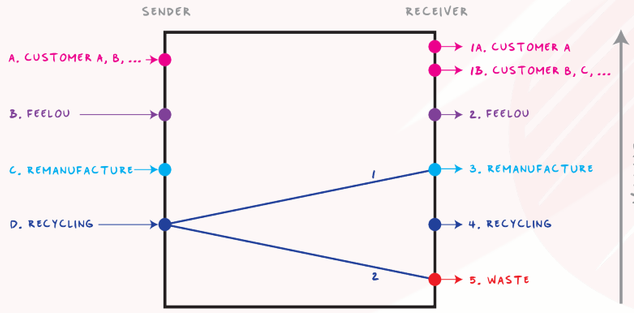


Figure 20: Recycling in the RFD.

Because of the Perceived hygiene paradox (Chapter 1.5), most bras will probably have only one or two life cycles. Therefore, the remanufacturing workshop will be significantly smaller than the manufacturing side and fusing them might be a more economically viable option. Furthermore, the remanufacturing site will have a waste stream of bras that are rejected, which could easily be combined with the waste stream of cutting waste. Even though this would theoretically be a preferable system, Feelou currently works with a partner for manufacturing, so it could be easier to set up separate nodes for the returned bras.

Recycling

This chapter discusses recycling in the RFD. The recycling industry and currently used material for the bra are discussed too, as these are essential in understanding recycling as a node in the Feelou system. Recycling is the most fuzzy topic in the resource flow diagram. The context is different depending on who throws something away and where it is thrown away. However, for simplicity the flows can be reduced to two (figure 20). When a product goes to a recycling plant, its resources can either be reused by a manufacturer, or the resources are wasted. In circularity downcycling just means slowing the loop, but eventually the materials will end up in waste unless they are compostable. To close the loop, which would be 100% circularity, all materials going into recycling should be recycled in such a way that they can be remanufactured or composted and products should also be made from 100% recycled or biobased material.

To increase circularity and credibility as a sustainable brand, Feelou needs to know what happens to their products at the end of life phase. This phase needed to be understood better, so the recycling industry and the material were explored.

Recycling industry

To measure the impact and circularity of the PSS of Feelou, it is important to know which percentage of the product can be fully recycled and used again, which percentage can be downcycled and finally, which percentage ends up in waste. There are many things that can influence these percentages, and few exact numbers are actually known. However, the French extended producer responsibility (EPR) policy estimates that 40% of the clothing that enters their flow ends up being reused, a large portion of that is shipped to Africa (Bukhari et al., 2018). Thus, 60% ends up in recycling and downcycling programs or waste. Exact numbers are hard to find as the industry is opaque, but what happens to waste in the Netherlands seems to be similar (BNNVARA, 2019). The service blueprint in Chapter 2.3 discusses recycling within the circular business model further, but these numbers show that the recycling industry is far from circular. Therefore, slowing the loop by reuse, repair and refurbishment is important to reduce the amount of resources that are recycled.

Material

As the material influences options for recycling in the circular business model, further research was done on the currently used material for the bra. Currently, Feelou uses MicroModal from Lenzing, which is sustainably sourced from FSC wood or PEFC certified forests (Hodakel, 2022). It uses much less water to dye than cotton (10-20x less). However, this material is not considered organic, as it uses the xanthatiation process which is harmful to humans and the planet. Specifically TENCEL Modal, made by Lenzing, uses PEFC wood and

a closed-loop production system, which reduces harm significantly (Batista, 2022). Still, it should be considered part of the technocycle within the Butterfly Diagram because of this step in the process. Therefore it should be recycled fully in an ideal circular system. Biocycle materials enable cascaded use and eventual composting, so options surrounding biodegradable materials could be considered in the future. As this concerns the design of the product itself, researching biocycle materials was outside the scope of this project.

Conclusion
The resource flow analysis provides a deeper understanding of the Feelou system and how the paradoxes provide design challenges in this system. Both a lease and a sales model have many challenges considering circularity, so a decision needs to be made which model will be further explored. Another big challenge for the circular business model is the Perceived hygiene paradox, as it significantly impacts the amount of bras going through the upper layer of the RFD. Finally, the recycling industry needs much development to accomplish circularity, therefore the focus should lie on both slowing the loops and inner loops, thus using the upper layer of the RFD.

INSIGHTS OF THE RESOURCE FLOW ANALYSIS:

- A FOCUS ON THE INNER LOOPS IS ADVISED AS THIS IS WITHIN FEELOUS POWER (SYSTEM BOUNDARIES).
- A LEASE MODEL PROVIDES SIGNIFICANT CHALLENGES ON TOP OF THE EXISTING ONES, THEREFORE A SALES MODEL IS ADVISED.
- AS FEELOU WORKS WITH A MANUFACTURING PARTNER, NODES FOR REPAIR/REFURBISHMENT NEED TO BE SET UP SEPARATELY.
- SLOWING THE LOOPS REDUCES THE AMOUNT OF RESOURCES ENTERING THE RECYCLING STAGE, THIS STAGE IS FAR FROM CIRCULAR IN THE CURRENT INDUSTRY.
- THE MAIN CHALLENGE IN CONCEPTUALISATION LIES IN SOLVING THE PERCEIVED HYGIENE PARADOX, AS IT WOULD UNLOCK THE INNER LOOPS.

1.7 Conclusion to the research phase

In the research phase, a complete overview of the theoretical Feelou PSS is given through the Resource Flow Diagram, iteratively designed with the Butterfly Diagram as a starting point. Using this diagram, the PSS could be analysed systematically by looking at the system as a whole and each resource flow individually. The resulting description of flows are based on current practices in the clothing industry and preferences of customers. Also, Circular Economy Principles were taken into account while analysing different flows in the system.

During this analysis, three important paradoxes were found that need to be taken into account during the conceptualization phase. These are: the Business model paradox, the Perceived hygiene paradox and the Circular impact paradox. Each paradox shows an important dilemma or problem that needs to be overcome to work towards a more circular PSS for Feelou.

The lease model was dropped as a result of the resource flow analysis, therefore the Business model paradox has been reduced to the challenges the sales model brings in. These challenges mostly consider incentivising customers to return their bra to Feelou and passing it on to the next user. Finding the second (or later) users for bras is hard because of the Perceived hygiene paradox, although a promising solution could be to stimulate passing on between friends and family members. This would improve the throughput of inner loops in the system (or higher flows in the RFD), resulting in less resources going to recycling. As the current recycling industry needs development, Feelous power is in the inner circles. There, Feelou can inspire customers and set up a circular business model to improve the lifetime of bras and reduce waste.

The main challenge in the conceptualisation phase lies in motivating customers to adapt their mindset. Customers need to understand why Feelou is worth their efforts as a sustainable company and Feelou needs to convince them to reuse and return their bras to build a circular business model. Feelou needs to stand out between greenwashing companies by being open about their efforts to adopt a circular business model.

2. Conceptualisation

2.1 Introduction

The conceptualization phase aims to solve the Perceived hygiene paradox and find solutions to improve the resource flow through the inner loops (or the higher flows in the RFD). Secondly, the challenges of the sales model (as described in the Business model paradox in chapter 1.5) need to be addressed in order to make the sales model a viable sustainable solution. As seen in figure 21, the circular business model has three main parts: Service System, Brand and Customer. This is a parallel to the sender-receiver model (figure 22), also known as the Shannon-Weaver Model (Shannon, 1948): the brand is a medium through which the service system is communicated to the customer. Therefore, the brand experience has a significant influence on the effectiveness and circularity of the service system and vice versa.

A brainstorm was organised to look at the top flows of the RFD with the aim of finding solutions for the Perceived hygiene paradox and the challenges of the sales model. The System & Brand parts were developed through a Service Blueprint, Business Model Canvas and Brand DNA. A roadmap shows the strategy for implementation and improvement of the circular business model. The roadmap puts all parts of the system in perspective through a clear timeline showing when relevant parts should be added to the system.

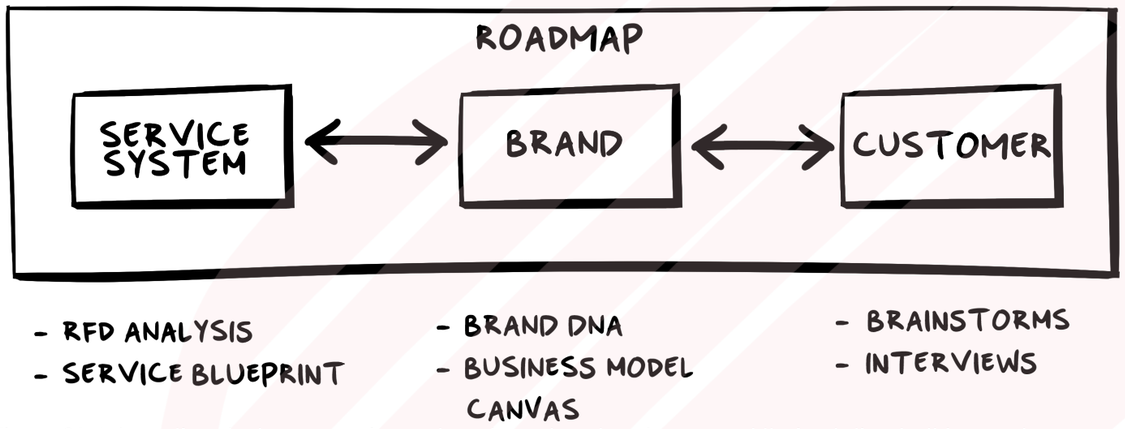


Figure 21: Interactions between service system, brand and customer and their relation to this report.

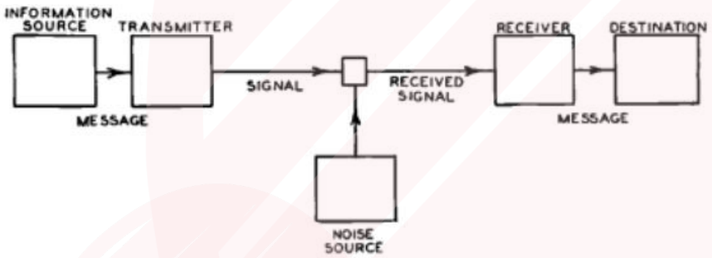


Figure 22: Shannon-Weaver model (Shannon, 1948).

2.2 Brainstorm

The brainstorm sessions were used as the main form of ideation in this project. These sessions aimed to find solutions for the Perceived hygiene paradox and the challenges for the return system that arise from the choice of a sales model, all from the perspective of the customer. The research phase had a strong focus on analysis with a few interviews, so collecting more customer input was necessary to make sure the resulting circular business model would effectively address customer needs. To gather this input, participatory sessions were organised, both with mothers and fellow students. The sessions with mothers provided some valuable insights into their priorities for an effective return and reuse system.

The focus of these brainstorm sessions was the life extension process. To improve the lifespan of the bra, a new user needs to be found if the product is still usable, otherwise the product needs to be recycled properly. According to the RFD as explored in the Research Phase (Chapter 1.6: Customer decisions), reuse and recycling can be done both directly by the user or indirectly with Feelou as an intermediate. Either the product is passed on to a second user that is known or it is recycled by the first user, or the product is sent back to Feelou and resold/recycled. This EoL system was explored by brainstorming with young mothers in a playground and again with fellow students at the faculty.

To explore this system of interactions between users and Feelou, several steps were taken:

1. Planning of a central brainstorm at the IDE faculty - *This failed because not enough participants were found.*
2. Exploratory interviews at a playground - *This was also an attempt to find more participants for the central brainstorm.*
3. Formulation of HKJ's ("Hoe Kun Je", ENG: How can you)
4. Brainstorm 1: with mothers at the same playground - *This was a pivot to gain relevant brainstorm information at a playground.*
5. Brainstorm 2: with students from IDE - *This was used to expand the ideas from brainstorm 1.*
6. Clustering - *All input was clustered to find valuable areas.*
7. Concept ideas - *These formed the basis of the resources in the roadmap.*

1. Central brainstorm

To find participants for the central brainstorm session, a message was formulated inviting mothers to come to a brainstorm session at the faculty. As compensation, they would be given free lunch afterwards, which was also giving them a little time to chat after the session. A post was put on the Feelou Instagram page and in the mailing list, and on Facebook the message was sent to various groups (not directly related to Feelou). The Feelou messages had no replies, and the Facebook group messages got 3 replies. However, despite their enthusiasm to join, these participants could not join on the same day due to busy schedules. Therefore it was decided to pivot and try another approach. The target group seemed to be very busy, so going to them instead of letting them come to the faculty could be a more effective approach.

2. Exploratory interviews

As a final attempt to ask mothers to come to the faculty, they were approached on a playground while their children were playing. However, as mothers were approached anyway, small interviews were conducted too (Appendix E1, E2). In these interviews (n=4), their view on second-hand clothing was explored and their interest and approach to sustainability were also discussed. Finally, questions were asked about their bra purchases during and around pregnancy to see how the value proposition of Feelou matched their interests.

The women that were approached all had their young child(ren) with them and concluding from their reactions to the questions that were asked, all fitted the target group. They all declined to join the central session and it was decided to cancel it. All mothers were enthusiastic to answer questions and interested in the topic, but they turned out to be too busy to come to a centrally planned session. Instead, a second visit to the playground with some prepared brainstorm materials was planned and mothers were asked to join on the spot.

3. HKJ formulation

To prepare for these playground brainstorm sessions, HKJs (Hoe kun je..) were formulated. HKJs aim to inspire creativity by asking an open question that can be answered in many ways. They centred around the system of interactions between the users and Feelou surrounding return and reuse/resale. These are the inner loops in which Feelou can have a strong influence. The process was divided in five steps: convincing, motivating, (reducing) effort, reward and (increasing) value. These are the steps a customer goes through while the product is returned and reused. Focusing on these steps, the brainstorm session should provide solutions for this process that are attractive to the target group.

1. Convincing: The customer needs to be convinced that the process is worth the effort.
2. Motivating: The customer needs motivation to act.
3. (Reducing) effort: The process must be easy to be able to compete with throwing it away.
4. Reward: There needs to be some kind of reward after this sustainable behaviour, as it will probably always be an extra effort.
5. (Increasing) value: The value of the used bra needs to be increased to solve the Perceived hygiene paradox.

The first four steps solve the challenge of a sales model, as stated in the Business model paradox (chapter 1.5). The fifth step aims to find solutions for the Perceived Hygiene paradox.

Each step in the interactions of the return and resale process was converted to a HKJ. To make it easier for the target group, who are not as used to brainstorming as designers, HKJs consisted of two parts: a general formulation (numbers) and a formulation specific to the project (letters). The following HKJs were used in Dutch:

1. Hoe kun je mensen overtuigen? - How can you persuade people?
   - ► Hoe kun je mensen overtuigen om een ongebruikte bh door te geven of terug te sturen? - How can you persuade people to pass on or return an unused bra? (This one turned out to be confusing, as people interpreted unused as not used at all, not as a product that is not used anymore).
2. Hoe kun je mensen motiveren? - How can you motivate people?
   - ► Hoe kun je mensen motiveren om de bh een tweede leven te geven? - How can you motivate people to give a second life to the bra?
3. Hoe kun je iets makkelijker maken? - How can you make something easier?
   - ► Hoe kun je het makkelijk maken om gebruikte bh's terug te sturen? - How can you make it easier to return used bras?

4. Hoe kun je mensen belonen? - How can you reward people?
   - ► Hoe kun je mensen belonen voor het retourneren van een gebruikte bh? - How can you reward people for a returned bra?
5. Hoe kun je ergens waarde aan geven? - How can you add value to something?
   - ► Hoe kun je een tweedehands bh waarde geven? - How can you give a pre-loved bra value?

4. Brainstorm 1 (mothers at playground)

As the playground used for the exploratory interviews turned out to have visitors that fitted the target group well, the same playground was visited on a Wednesday afternoon for the brainstorm sessions. More mothers were expected to turn up this afternoon, as children in primary school are free on these afternoons and mothers would probably visit the playground with them afterwards.

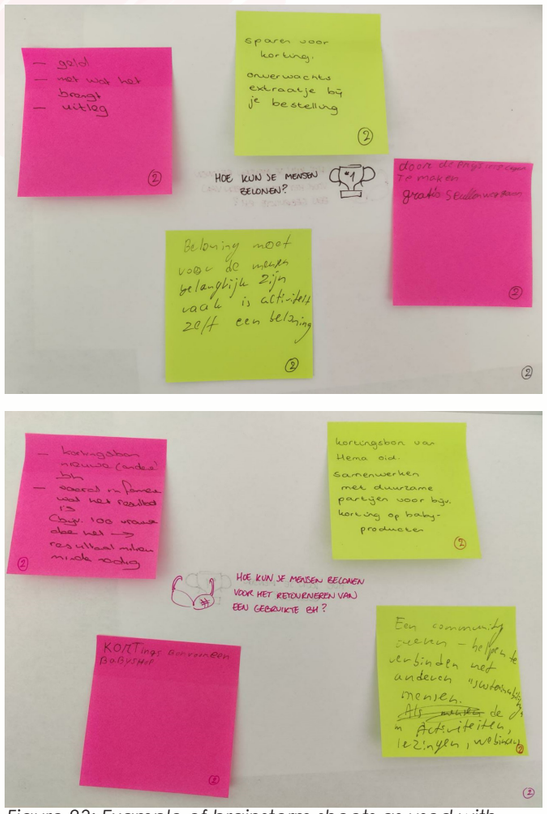


Figure 23: Example of brainstorm sheets as used with the playground mothers.

Again, several mothers were approached to fill in the brainstorm sheets with post-its. As participants were spread around the playground and came and left at different times, it was decided to let them fill in the sheets one by one. This was a time consuming approach, but it allowed for more flexibility in finding participants and higher quality results because of the more personal setting.

After every session, post-its were left on the sheets so further participants could use them as inspirations for their own contributions (figure 23). The sessions all took place on this Wednesday afternoon and 5 people participated, of which two filled in post-its together. The complete results can be found in Appendix D.

5. Brainstorm 2 (fellow students)

After the sessions with mothers at the playground and an initial attempt to make clusters, it was decided that more ideas needed to be generated. However, as the playground sessions were rather time consuming, a different approach was necessary. As the original plan was to have one central session with both students and mothers, a second brainstorm was organised with fellow students. With 3 students, all more specific HKJ's were brainstormed in a round the table setting until everyone filled in all HKJ's.

6. Clustering

The results of both brainstorms were digitised in Miro and clustered to find themes and similar solutions (figure 24). The clusters are focused on different parts of Feelous business model that can be improved to increase the circularity of the system:

- *Communication:* Informing customers is important to combat greenwashing (chapter 1.3).
- *Improving the service system:* The resource flow analysis (chapter 1.6) showed challenges in setting up a circular business model. Participants gave valuable input showing what is considered a good service.
- *Increasing value of the product:* To combat the Perceived hygiene paradox (chapter 1.5), input was given to increase the value of the pre-loved product.
- *Providing incentives for the customer:* Many incentives were provided that increased the envisioned behaviour of customers. Some were put in different clusters as there was much variation between incentives.

The ideas are sorted into clusters based on these criteria, some criteria are split up into multiple clusters. all clusters have a name that fits the ideas in it. The clusters aim to provide insight into the priorities of the customer when they are considering buying or returning a product. The clusters also show challenges and possible solutions to stimulate sustainable behaviour.

The clusters were (from biggest to smallest):

1. *Inform: Activity = reward* - 39 post its → Emphasise the sustainable action as a reward in itself
2. *Consumption rewards* - 27 post its → Provide incentives by rewarding customers for sustainable behaviours (offering discounts or gifts in return)
3. *Make it easy* - 27 post its → Methods that help make sustainable behaviour easy
4. *Increase (emotional) value* - 19 post its → Methods to increase the value of the bra
5. *Community feeling* - 15 post its → Help people to connect to each other, host activities
6. *Negative attention* - 6 post its → Getting attention by negative means
7. *Emphasis on second user* - 5 post its → Improving the connection with the next user
8. *Lead by example* - 4 post its → Focus on a role model
9. *Media - 4 post its* → Using different media to convey the message

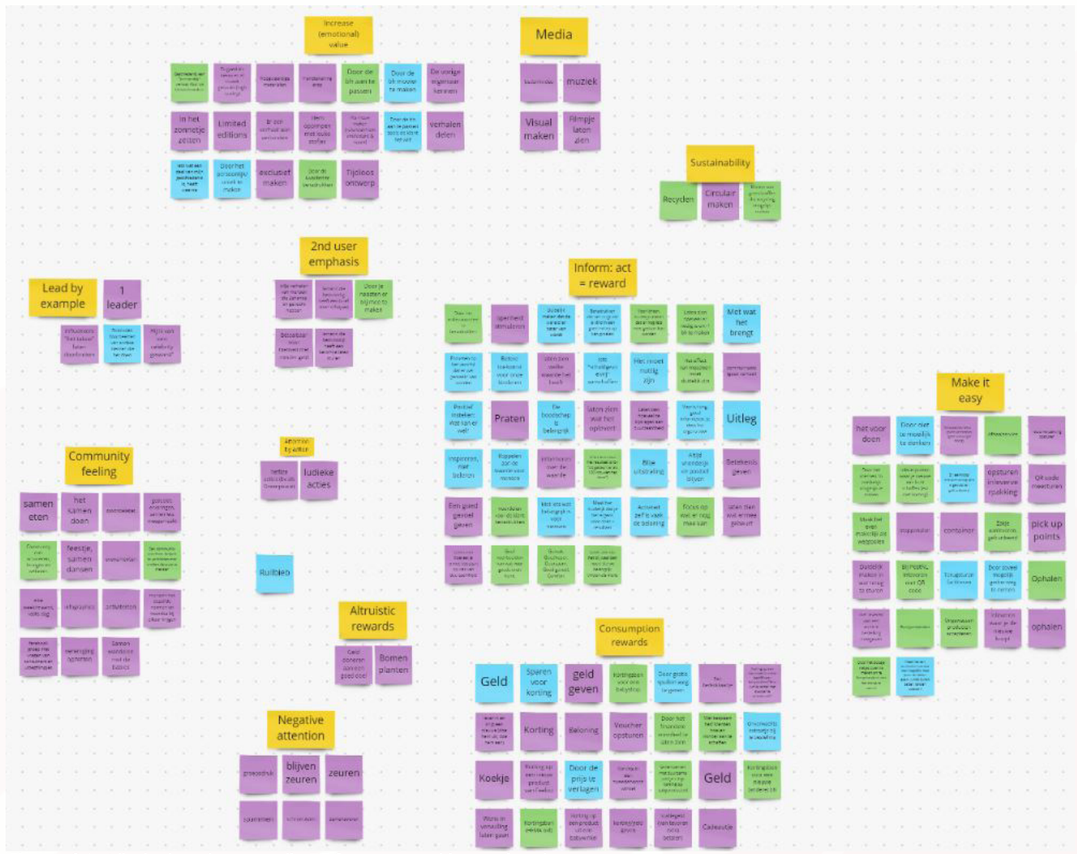


Figure 24: All clusters (appendix E7 for zoomed in versions).

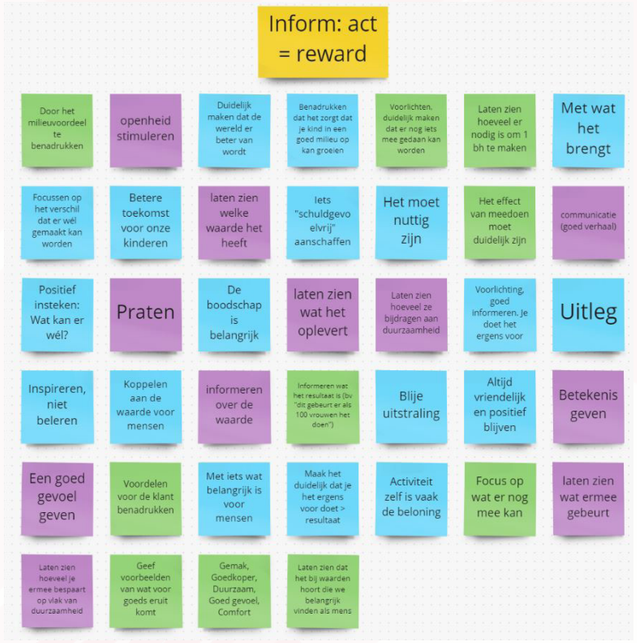


Figure 25: Act = reward cluster.

10. *Circularity aspects* - 3 post its → Methods to improve sustainability
11. *Altruistic rewards* - 2 post its
12. *Attention by action* - 2 post its

It turned out that the biggest cluster was focussing on the action itself as a reward. As post-its from the different sessions were colour coded (blue = broad HKJs, green = specific HKJs, purple = student brainstorm), it was clear that many ideas in this cluster came from the mothers themselves, not the students (Figure 25). Apparently, the target group is not looking for rewards focused on more consumption, but they look for the positive feeling that is invoked in the action itself. This was the most valuable insight and further ideas could be generated using this idea as a starting point.

7. Concept ideas

The ideas from participants and the clusters that followed from them provided inspiration for the ideas listed in this chapter. The listed ideas mostly aim to stimulate returns and make reuse more attractive. Some were actual post-its in the brainstorm, other ideas were inspired by them but needed further development. As many ideas concern a different part of the complete service model, multiple ideas can be used in the final service model. And as Feelou is still in the startup phase, multiple ideas could be tested in different forms to find which ideas work best.

- Asking the user to prepare the bra for recycling by separating parts before return (this idea rose up during the resource flow analysis)
  - Coloured stitches where parts need to be separated → Showing how a user can contribute to better recycling by cutting the bra before returning it (if it can't be used anymore)
- Positive messaging (cluster 3: Action = reward).
  - Show the user the value of reuse and recycling
  - Always stay friendly and positive
  - Reduce feelings of guilt
  - Show examples to clarify
- A letter from the perspective of the bra, explaining an ideal lifecycle → Informative + Improves attachment to the product (cluster 1: action = reward & cluster 4: increase emotional value): the post-its in these clusters can provide input in the specific contents of this letter.
- Also, numerous "consumption" rewards were provided (cluster 2: consumption rewards, also inspired by current business practices):
  - Discount on the next product (figure 26.1, top)
  - Discount on a related sustainable product (baby shop?)
  - Discount in a second hand shop

Figure 26.1: Some companies provide small rewards for certain behaviour.

- And more altruïstic rewards (cluster 11: altruistic rewards, also inspired by current business practices):
  - Planting trees for every returned bra (figure 26.1, bottom)
  - Donating to charity
- A label with "return me to Feelou" → During the usephase, the user will be repeatedly reminded to return the bra (cluster 3: make it easy, specifically the idea in figure 26.2)
- Smooth return system (cluster 3: make it easy):
  - A QR-coded label that forwards to relevant lifecycle (return) information on the website
  - A pre-stamped return package sent to the customer if they want to return the package
  - Pickup points at places where you can buy bras
  - Sending a return package with the bra immediately
- Tell the story from a previous user (cluster 4: increase emotional value)
- Personalise the bra through coloured fabrics, stitches etc. (cluster 4: increase emotional value)
- Providing a community for people that have a similar mindset (cluster 1: action = reward & cluster 5: community feeling)
  - With lectures/workshops
  - Go on a walk with the babies together
  - Sharing experiences
  - Come together on a regular basis
  - Explainers on how to live sustainably

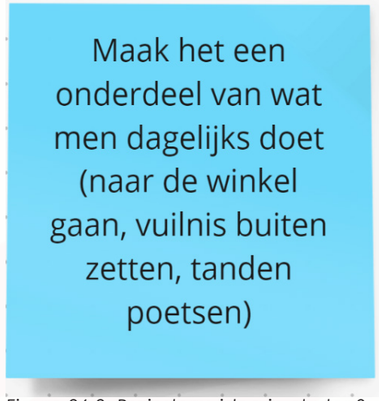
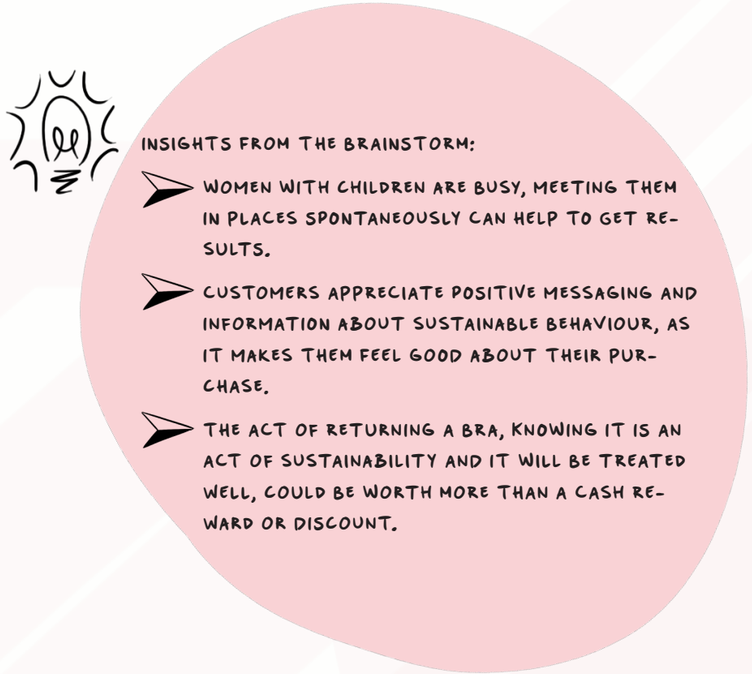


Figure 26.2: Brainstorm idea in cluster 3

Conclusion

The brainstorm sessions provided many ideas as an input for the ideation process. The most valuable ideas will be input for the resources in the roadmap (chapter 2.6), where they will be further developed into concepts. An important insight from these sessions was the importance of brand communication. Cluster 1: activity = reward, shows that customers value positive messaging. They want to feel good about a sustainable purchase. This was emphasised by customers even more than Cluster 2: consumption rewards. A key idea to let customers feel good about their purchase, would be the letter. It can emphasise why a customer did good by purchasing the bra and at the same time inform the customer how they can continue this sustainable behaviour.



2.3 Service blueprint

Introduction

The RFM and brainstorms provided enough components to build a rather complete structure of the circular business model. To gain an overview of this business model, a service blueprint was made. It shows the layout of the service system, touchpoints with customers and the backend that is necessary to provide the services of the circular business model. It puts all the separate ideas from the RFD and the brainstorm together in an overview of the system, showing clear connections between all parts of the service.

Sales vs lease model

As concluded after the resource flow analysis, an important decision needed to be made considering the Business model paradox (chapter 1.5). A Q&A session with Mudjeans (appendix F) provided a better understanding of the implications of a lease model in contrast to a sales model. During this session, it was disclosed that this company had many challenges with their lease model. This is why Mudjeans both sells and leases their jeans. The lease model makes up 50% of their web sales and 20-25% of their revenue. The gap in these figures is explained by the retail sales, as the lease model is only sold on their website. Feelou already has the challenge of the Perceived Hygiene Paradox additional to the challenges Mudjeans had with their lease model. As described in the Business model paradox, the sales model already had a preference. Therefore a sales model would be the most viable option, at least until enough resources are available to experiment with lease model possibilities.

The interview with Mudjeans formed a conclusion to the Business Model Paradox, and the RFM and brainstorms provided the components for a rather complete structure of the PSS already, so a Service Blueprint was made to gain a better overview of the different layers and steps. This is shown in figure 27. The left side (red, sales model) follows a regular linear sales model. However, after the usephase there is an extra segment where the user is asked to pass on or return the product when it is not used anymore (yellow).

In a linear scenario, the connection between company and customer ends at the sale of a product. However, for a circular business model it is important to also think about the End-of-Life scenarios. All parts that are related to the circular business model are green. In these parts Repair, Reuse, Refurbish and Recycle are implemented in this business model.

Stimulation at different stages of the usephase

Through the service blueprint, three moments can be identified to remind and incentivise the user to pass on or return the bra, thus extending the life expectancy of the product. Firstly, when the product is bought from Feelou. At this stage, it will take a while before the envisioned behaviour will take place so the message should be impactful and it should stick with the user throughout the whole usephase to make sure the user actually makes an effort to extend the lifetime of the product. In this phase, a return package or a letter with instructions might be effective tools.

Secondly, the user can be reminded to discard the product responsibly during the usephase itself. In this phase, the user is reminded to think about the usefulness

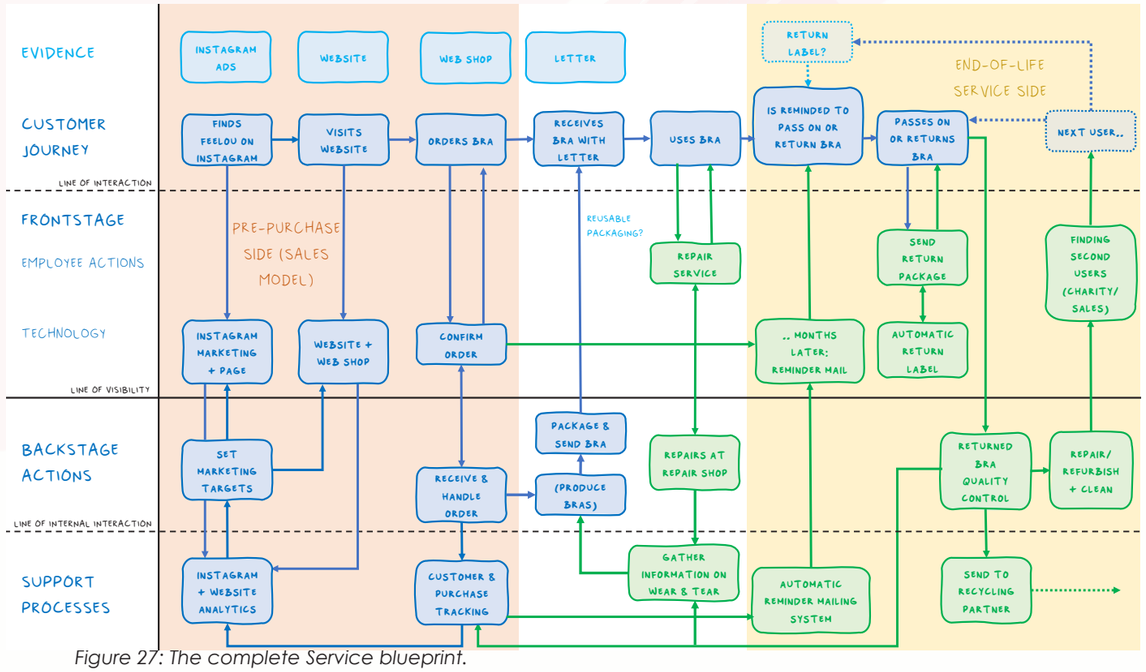


Figure 27: The complete Service blueprint.

of the product every time she wears it. Effective solutions here might be a return label on the bra itself or coloured stitching at spots that connect different materials to show how they should be separated for recycling.

Finally, there could be a moment that the product is not used anymore. It might be laying on a shelf collecting dust, the user might have forgotten about it or needs a little more stimulation to pass on the bra or return it to Feelou. As there is some user information collected during checkout, this data might be useful to estimate when the bra will not be used anymore, as its main usefulness is during and shortly after pregnancy. An automatic email or letter could be sent to the user to remind them of the most sustainable options. Due to AVG laws, it could be necessary to ask for permission to do this during the checkout process or in the letter.

"Pass on" scenario

Finding a second user can be done in multiple ways, with various levels of control and investment for Feelou. If the bra is passed on without interference of Feelou, it is possible that Feelou loses track of the bra. To improve the second lifespan of the bra and gather some data about the second user, Feelou could offer a quality control and repair/refurbishment in between users. This might be helpful in establishing a relationship with the second user and eventually making them return or pass on the bra too. In this way, extending the lifespan of the bra and improving the willingness to use second-hand products might go hand in hand. In an ideal circular scenario, the bra would have many users and passing it on would be an integral part of the service system. Preparing the service model for this ideal scenario will be useful to make implementation easier in the future.

Recycling

As sending back used bras to Feelou has more environmental impact than directly disposing of the bra by the user (a whole logistics system needs to be set up for returns), more research was done on the current status of the recycling industry in the Netherlands. Previously, it was hypothesised that a purer recycling stream would make recycling of the bras easier and more efficient. However, it turns out recyclers currently mostly produce fibres for the non-woven industry. Some new thread is made, but its materials are often not known very well as sorting of used fabrics is done by hand and mostly visually.

Usually, fabrics are processed in batches of 300-500 kg (appendix G). Because of this rather low efficiency and large volume, recycling a pure batch of bras might be a far future scenario (the weight of the prototype bra is 100g).

It could be interesting for Feelou to gather information about the wear of their bras. This information can be used to design better bras in the future. If enough second users can be found by Feelou and the positive impact of redesigns and life extension is larger than the negative impact of the supply chain that is necessary to retrieve the bras, it can still be sustainable to have this return system. Because of the low weight of the bra, it is a reasonable assumption that this threshold can be met easily as low weight means lower impact during transport, while producing clothing has a high footprint. Having this system in place will also make the company ready for future possibilities of the Circular Economy, as it will make setting up a lease or service model easier.

Conclusion

The service blueprint provides an overview of the service system surrounding the circular business model and shows touchpoints with the customer in this system. The Q&A with Mudjeans helped to conclude the Business model paradox. Therefore the service blueprint was made assuming a sales model. In this sales model, some challenges for the touchpoints rose up. There is an imbalance between the time until the expected behaviour is needed and the quality of the information that Feelou can provide. At sale, Feelou can provide better information but the expected behaviour will take a while. On the other hand, Feelou can reach customers much harder at the end of life stage, when the envisioned sustainable behaviour needs to be implemented.

By investing in refurbishment, Feelou could take more control over the "pass on" scenario, but that would require a larger investment compared to letting the customer handle it. A return program provides Feelou with much information about the wear of the product, but again requires a larger investment. Currently, the recycling industry cannot handle the small volume of Feelou bras well and even if it could, the resulting products would be mostly non-woven fabrics. This is considered downcycling and is not closing the loop. Therefore, increasing the lifespan of products is currently the most valuable improvement towards a circular business model.

INSIGHTS OF THE SERVICE BLUEPRINT:

- CUSTOMERS CAN BE STIMULATED INTO SUSTAINABLE BEHAVIOUR AT SALE, USE AND WHEN THE BRA IS NOT USED ANYMORE.
- THE "PASS ON" SCENARIO CAN BE PASSIVE OR WITH INTERVENTION BY FEELOU.
- RECYCLING IS A LAST RESORT OPTION, AS THE INDUSTRY POSSIBILITIES DO NOT FIT THE SMALL SCALE OF FEELOU RETURNS FOR A WHILE.
- A RETURN SYSTEM COULD PROVIDE FEELOU WITH VALUABLE INFORMATION ABOUT THE WEAR OF THE BRA, BUT IT WOULD REQUIRE A LARGER INVESTMENT.

2.4 Business model canvas

To gain an overview of all parts of the business model, the Business Model Canvas (BMC) was filled in (figure 28). The main insight from the BMC was the double focus of Customer Segments and the Value Proposition. Feelou focuses on both sustainability and comfort in their branding. A common practice with marketing sustainability is to emphasise other characteristics that the product has, as sustainability alone is often not enough to make a sale. This is why the Feelou bra could be targeted at two target groups that partly, but not completely, overlap. The first group is people who look for sustainable products and the second group is more focused on comfort and functionality.

To calculate the estimated size of the first group, the sustainable customers, a quick estimation was made: 165.000 women get pregnant each year (CBS, 2019a). Of all consumers 25-35 years old, 2% are frontrunners in sustainability and 19% say they follow "pretty quickly" (Milieu Centraal, 2018). This makes the size of the sustainability-focused target group 3.000-33.000 women. As this is a rather small target group, emphasising the comfort and functionality aspect of the bra might be necessary to attract more customers. As Feelou focuses mostly on women getting pregnant for the first time, that is 75.500 women (CBS, 2019b), this target group gets even smaller.

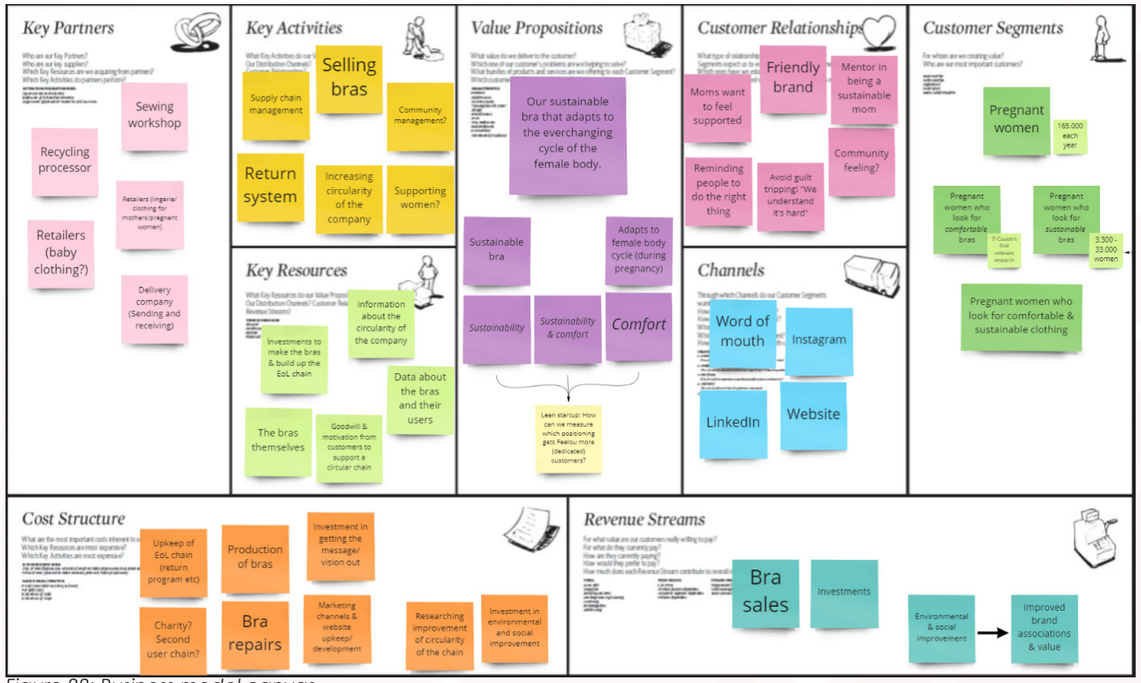


Figure 28: Business model canvas.

This is where the Circular Impact Paradox (chapter 1.5) comes into play. If the target group would just be sustainable people, the efficiency of a return system might be significantly higher because sustainable people will be easier to convince to return the product after it has become obsolete for them. For them, it is part of the reason why they bought the bra in the first place. However, selling more bras because of a broader target group has a bigger total positive impact as every bra sold replaces multiple regular bras. It might be harder to convince the "comfort and functionality"-customers to pass on or return the bra, which might make the average circularity of each bra lower, but this will also open more opportunities for improvement and large scale resource management.

INSIGHTS OF THE BUSINESS MODEL CANVAS:

- THE TARGET GROUP AND VALUE PROPOSITION OF FEELOU HAVE A DOUBLE FOCUS ON BOTH SUSTAINABILITY AND COMFORT.
- AS THE PURELY SUSTAINABLE TARGET GROUP IS QUITE SMALL, EXPANDING IT TO INCLUDE COMFORT CAN INCREASE THE NUMBER OF CUSTOMERS.

2.5 Brand DNA

Figure 29: From the Feelou website: focus on wearability and sustainability

Introduction

To deepen the understanding of the different options for the value proposition and target group within the Business Model Canvas, the Brand DNA was filled in. To start out, three branding options were explored: Sustainability, Comfort (wearability) and a combination of those two. These are the central themes that Feelou discussed in the interviews with users preceding this project, and themes that have been apparent in Feelous digital presence (figure 29). They have been the core focus of the designed bra.

The brand can be seen as a lens through which the service model is communicated. As seen in the Service blueprint in chapter 2.3, the business model of Feelou has a side that is seen by the customer, the frontstage, and a backstage side that is hidden from the customer. All interactions between Feelou and the customer take place in this frontstage, and they create a brand image for the customer. By emphasising certain characteristics in these interactions, Feelou can influence this image. Improving these characteristics improves brand equity, which in turn increases brand value (Aaker, 1992).

Comfort

As discussed in the introduction (chapter 1.1), comfort has been an important focus during the development of the Feelou bra. It was one of the pillars during the pilots with the initial prototypes. Not only should wearing it be comfortable and should the bra stay comfortable as sizes change, but also the purchase decision should be made easy. Mothers need to make many purchasing decisions both during and after pregnancy and reducing the stress this causes is important to Feelou. These characteristics can all be seen as ways Feelou wants to convey a message of caring, improving comfort (figure 30). Emphasising these characteristics, Feelou could position itself as a supportive brand.

Being a supportive brand, Feelou could strategically show their sustainable impact only where it is necessary. This would mean Feelou communicates their impact more modestly, for instance only informing customers about it within the return process. This might inspire less customers to return their products after use as it will be less well-known that Feelou has a return program. The circular side of the business model could therefore be overshadowed by the sales model.

Advantages of comfort focus:
- Could be a more resilient branding strategy
- Sustainability is normal, should not be a unique selling point
- Emphasis on advantages for the customer themselves
- Human centred design: we listened to our customers and they helped design the bra

Key brand associations:
- Comfortable
- Supportive
- Caring
- Reducing stress
- Wearability

Disadvantage: Less emphasis on sustainability might make the company itself less sustainable.

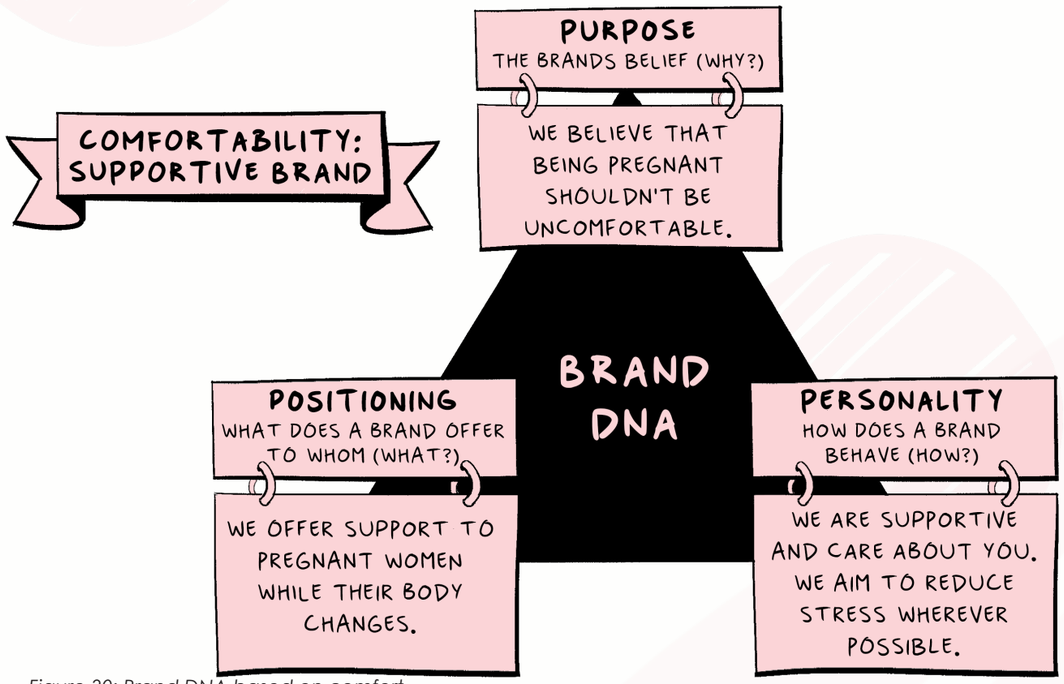


Figure 30: Brand DNA based on comfort.

Sustainability

Feelou put much effort into designing a bra that is sustainable, so this could also be used as the main component for the brand DNA (figure 31). Therefore it could be seen as a waste to not emphasise this in branding. It could also inspire customers to make sustainability a bigger part of their lives, which would indirectly increase the impact of Feelou in a more intangible way. Customers are willing to pay a premium for brands that are seen as sustainable, because these brands are seen as ethical and responsible. This increased revenue could support the sustainable mission of Feelou to build a circular business model and having this business model can in turn support the image of being a sustainable brand. Social sustainability is also part of this image: empathy and care for workers. Emphasising these characteristics can create an image of an ethical, trustworthy brand.

Everyone wants to make the world a better place, so this is an absolute polarity: no one wants to be the opposite (van der Vorst, 2017). By emphasising that Feelou is a sustainable company, Feelou calls all other bra companies unsustainable. This can work for a while, but the sustainable market is growing (Gatzer & Magnin, 2021) and competitors could catch up, at which point Feelou would need to refocus their branding strategy. This might take a while, and it could even be possible that Feelou stays a frontrunner with their circular business model, but it does require much effort to stay up front.

Advantages of focusing on sustainability:
- Trickle down effect: Inspire sustainable consumption
- Emphasis on service system: ethical brand
- Social sustainability: emphasis on empathy
- Everyone wants to make the world a better place

Key brand associations:
- Sustainable
- Ethical
- Social
- Empathy
- Trustworthy

Disadvantage: In the growing market of sustainability, it might be harder to stay competitive.

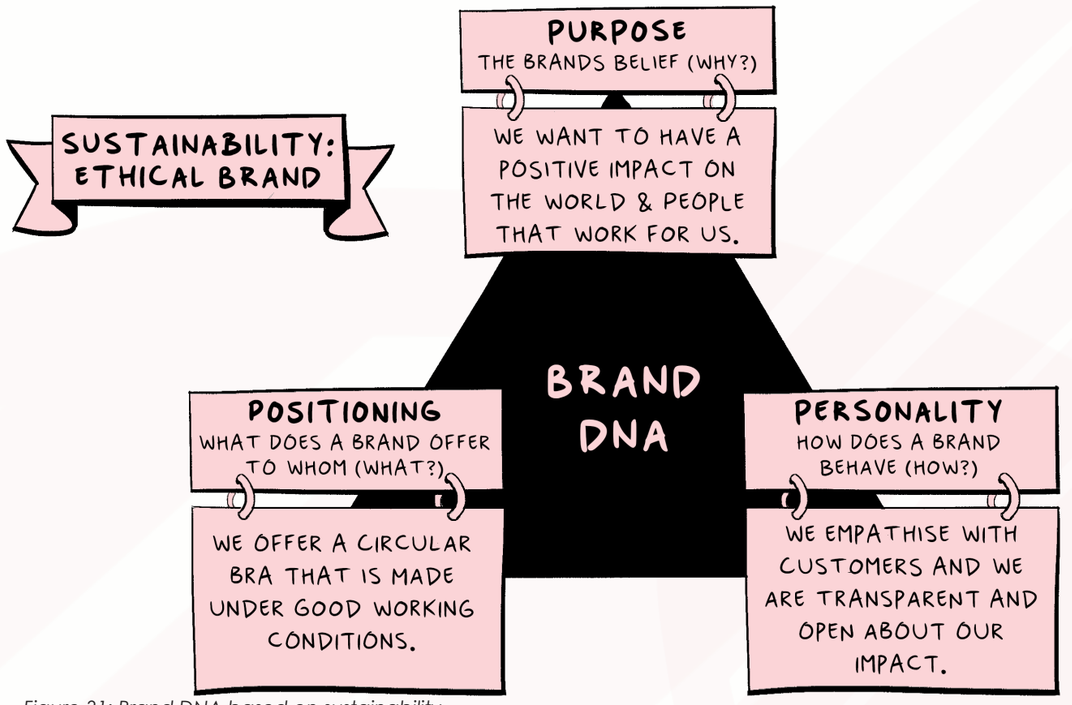


Figure 31: Brand DNA based on sustainability.

Comfort & sustainability

With the core characteristics that emerged during the pilot phase in mind, the final option would be to keep the dual focus on both sustainability and comfortability (figure 32). This combines the two previous characteristics into a stronger value proposition, as it removes some of the disadvantages of both of them. Going for a sustainable product is often seen as a compromise. You pay more, but do not get a personal gain from it. Instead, you get a good feeling, but this feeling might be gone quickly. By emphasising both comfort and sustainability, it becomes possible to emphasise both the personal value of a high quality product, and the societal and environmental values that are broader than the user. It becomes possible to offer a sustainable product without compromises on quality or looks. This can also broaden the target group to people that do not necessarily want to settle for a product of lower quality for sustainability reasons. If these people see that sustainable products do not have to be a compromise, they could be convinced to consume more sustainably.

By focusing on the combination of sustainability and comfort, Feelou can stay ahead of both established companies that try to become more sustainable and companies that offer a sustainable business model, but do it by compromising on other features. Additionally, once the market gets more sustainable, Feelou is already in a position to emphasise comfort more.

Advantages of dual focus:
- Emphasising both individual and environmental/societal gains
- Broader target group: more potential customers
- Might inspire less sustainable people
- Focus can be shifted when sustainability is not a unique selling point anymore

Key brand associations
- Caring (for you and the planet)
- Uncompromising sustainability
- Supportive
- Ethical
- Empathy

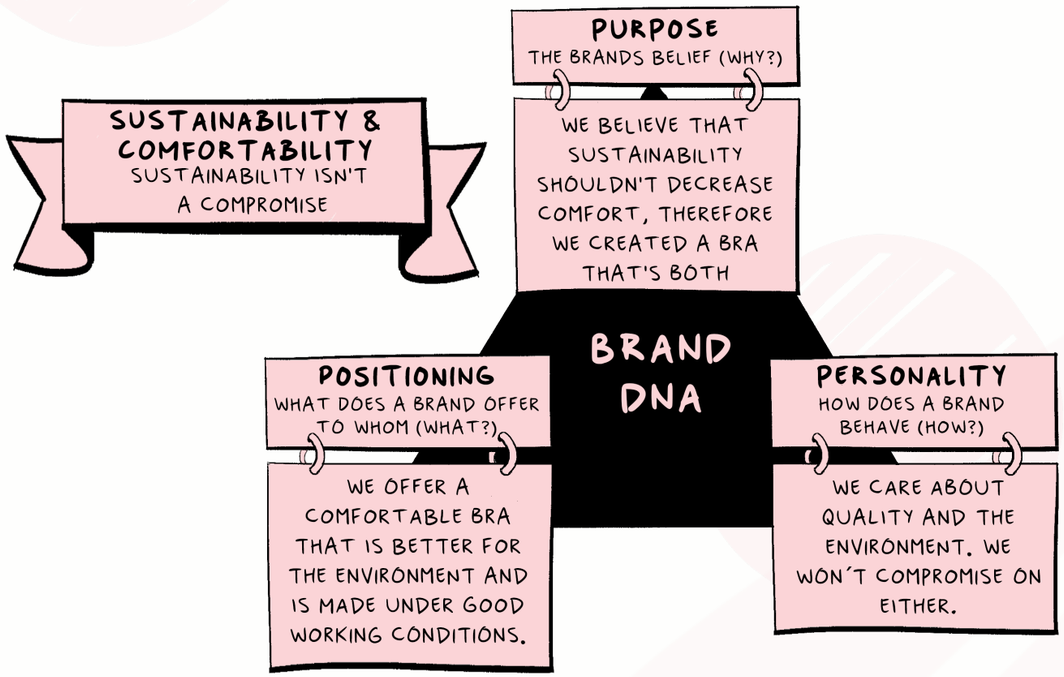


Figure 32: Brand DNA based on the combination of sustainability and comfort.

Conclusion

The reflection on the Feelou brand DNA provided insight into the two main components of Feelou: comfort and sustainability. Individually, these components both have disadvantages. Focusing on comfort would attract less sustainable customers and it would give Feelou reduced possibilities of inspiring sustainable behaviour. On the other hand, focusing on sustainable behaviour would make the target group smaller. Furthermore, with a world moving towards sustainability it could reduce competitive advantage in the long term because sustainable alternatives will come up. Combining these two aspects however, balances both individual gain for the consumer and benefits for the planet. This combined incentive could increase competitiveness significantly.

INSIGHTS OF THE BRAND DNA:

- A FOCUS ON COMFORT REDUCES THE IMPACT BECAUSE THE INFORMATION ABOUT THE SUSTAINABLE BUSINESS MODEL WOULD BE LESS APPARENT.
- A FOCUS ON SUSTAINABILITY COULD REDUCE THE LONG TERM COMPETITIVE ADVANTAGE.
- FOCUSING ON BOTH COMFORT AND SUSTAINABILITY SHOWS THE CUSTOMER BOTH PERSONAL BENEFITS AND BENEFITS FOR THE PLANET.

2.6 Roadmap

The RFD provides a theoretically ideal system for a circular business model. However, currently there is no service system at all. The aim of this project was to develop a circular business model for Feelou, in order to extend the lifespan and circularity of the bra. The roadmap described in this chapter (figure 34, page 44) provides the steps that need to be taken in order to get from a linear product-oriented startup to the envisioned circular business model. The goal of a roadmap is to divide the road to an end goal into smaller steps, in order to get a better overview of the priorities in each phase of the development. It also provides resources in each horizon that fit to the scale of the circular business model at that point.

The roadmap is divided in 3 horizons, the Startup phase, Scale up and Ideal (business) model. The phases are based on the scale of returns and therefore the size of the service system that is the circular part of the business model. Feelou functions as a hub, connecting stakeholders within the clothing ecosystem. In this system, Feelou works with a clothing workshop to produce batches of bras and then sells them to customers. This is the sales model part of the Service Blueprint (fig 27: the left side of the Service Blueprint). However, Feelou aspires to have a circular business model, so more stakeholders are needed for the circular aspects of their business model. This part of the business model should be built as demand and budget for it rises. This demand is created by Feelou itself, but also by the market as people want to treat their products more sustainably (market pull). The sales part of the business model grows revenue directly, while the service part of the model is an investment that increases brand value and therefore indirectly increases sales.

The Roadmap provides a framework to manage the growth of the service model. As the sales model is linear and rather straightforward, the only constraint it has on the service model is the revenue that can go towards developing the service model (Fig 33). Therefore the horizons of the Roadmap are based on the size of the service model, independently of the number of sales. More sales probably mean a larger service model because more bras are returned, but also more revenue to develop the service model and a scale advantage as the service model grows. However there is a delay between increased sales and the necessity for a larger service model (the length of the use phase), which should provide enough time to scale up the service model with increasing sales.

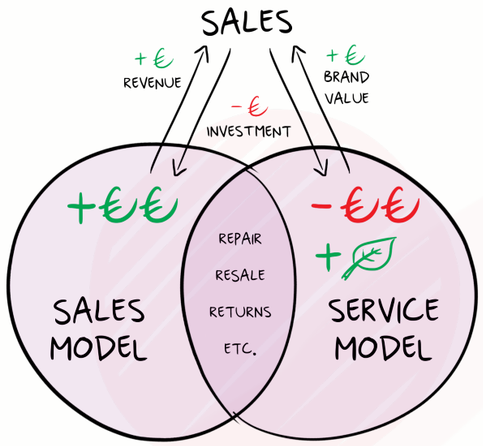
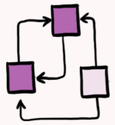


Figure 33: The revenue system of a circular business model for Feelou.

The rows of the Roadmap are divided as follows:

Main task: The most important task in this horizon.

Scale indicator: The scale of the service model, based on the input into the system (the returns).



Business model focus: The focus of development within the Feelou service system.

KPIs to track: The Key Performance Indicators, these are the most important statistics to estimate the size and growth of the service system.

Data insights: The data that should be gathered to improve the service system and therefore the circularity of Feelou.

Resources: A collection of ideas that are helpful in this horizon. The ideas have been ranked, with the most promising ideas discussed first.

In the following chapters, each horizon will be discussed from “main task” to “resources”. This should give an idea of the general development of the circular business model.

ROADMAP TO A CIRCULAR BRA BUSINESS MODEL

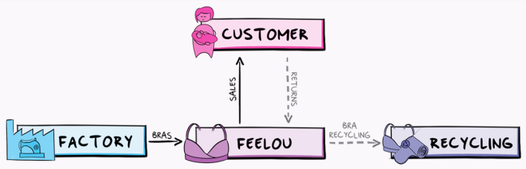
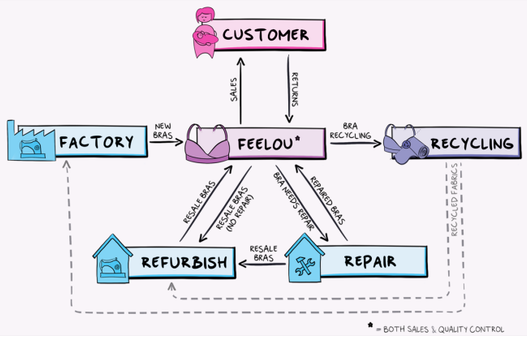
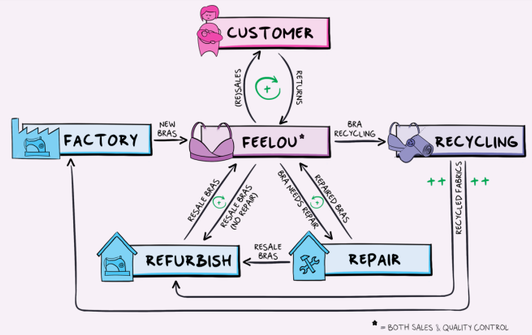
	HORIZON 1: STARTUP	HORIZON 2: SCALE UP	HORIZON 3: IDEAL MODEL
MAIN TASK	LAUNCH + INSPIRING EVENTUAL PASSING ON OR RETURNING	SET UP REPAIR SHOP + BETTER RECYCLING PROCESS	IMPACT MEASUREMENT TO OPTIMIZE SYSTEM, DATA DRIVEN IMPROVEMENT
SCALE INDICATOR	0 - 200* BRAS RETURNED * MANUAL LABOUR WOULD BE POSSIBLE	200 - 2000* BRAS RETURNED * NEED TO AUTOMATE ARISES, MANUALLY HANDLE OUTLIERS	2000+* BRAS RETURNED * AUTOMATION NEEDS TO BE SMOOTH & OPTIMIZED
BUSINESS MODEL FOCUS			
KPI'S TO TRACK	SALES ENGAGEMENT RETURNS	RETURNS SECOND USERS ENGAGEMENT REPAIRS	RETURNS REPAIRS PRODUCT LIFETIME ENGAGEMENT REFURBISHMENTS
DATA INSIGHTS	HOW CAN WE INSPIRE CUSTOMERS TO TREAT THEIR BRA SUSTAINABLY?	WHAT CAN WE DO TO IMPROVE THE QUALITY OF A USED BRA? HOW CAN WE SOLVE THE PERCEIVED HYGIENE PARADOX ON A LARGER SCALE?	HOW CAN WE EMPOWER AND INSPIRE OUR EMPLOYEES TO MAKE THE BEST SUSTAINABLE DECISION TRHOUGHOUT THE SUPPLY CHAIN?
RESOURCES	LETTER RETURN PACKAGE POSITIVE MESSAGING WEBSITE: MAKE IT EASY & INFORM INVITE USERS TO PASS ON THE BRA QR CODE SOCIAL MEDIA: INSPIRE RETURN LABEL QUALITATIVE DATA GATHERING	QUALITY CONTROL (IN BETWEEN USERS?) REPAIR SHOP (IX OR ALWAYS FREE?) PERSONALIZE ACTIVITY = REWARD DEEP CLEANING + TOUCH UP "PRE-LOVED" POSSIBILITIES STORY FROM PREVIOUS OWNER	DATA GATHERING DATABASE DESIGN INFORM ABOUT IMPACT IMPACT MEASUREMENT COMMUNITY TEACHING WORKFORCE TO IMPROVE LIFESPAN TRACK BRAS THROUGH SYSTEM

Figure 34: The full roadmap.

Horizon 1: Startup

Main task & scale indicator

The first horizon is the Startup-phase. In this horizon, there is an emphasis on the sales model as revenue needs to be generated first. As the usephase of the bra takes a while, there is no need for a service model yet. However, customers can already be hinted towards sustainable behaviour that helps eventual return.

The size of the initial market for Feelou is roughly 1.500 customers/year. This is calculated by the total number of women per year that get pregnant for the first time (the initial target group of Feelou) in the Netherlands, 75.500 (CBS, 2019b), of which 2% see themselves as sustainable frontrunners. 19% say they follow "pretty quickly" (Milieu Centraal, 2018). This would grow the market of followers to over 14.000 women. In the Innovation Adoption Curve (Rogers, 1962), these frontrunners could be seen as the innovators, while the next group would be the early adopters. As there are not that many sustainable alternatives in the bra industry, especially none aiming for a circular business model, it might be possible to reach a large portion of these customers.

In this phase, there is no service model yet. However, it would be possible to process the first returns by hand. A volume of 200 bras per year is reasonable to handle without a systematic approach. These initial returns will provide insights on the wear and tear of the bra, which could improve redesign for a new batch. It can also help in estimating the interest in returning used products. Thirdly, the returned bras can serve as samples for running pilots. When the service model reaches the threshold of 200 returned bras, it is time to move on to horizon 2 and scale up the model.

Business model focus

Initially, the business model should focus on the sales part of the system (fig 34). This is the main Engine of Growth (Reis, 2011), as sales provide revenue that can directly be invested in generating more sales. It is not necessary to set up the service system without any product returns, and there is not enough revenue to sustain a service model at this early stage. However, customers should already be inspired at the point of sale to return their bra to Feelou eventually, so repairs and refurbishment can be offered on a small pilot-scale already.

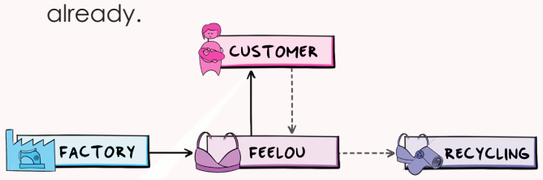


Figure 34: Systemic visual of the initial business model.

KPI's to track

Number of sales

In the Startup phase, the main KPI that needs to be monitored is the number of sales. This is a key statistic to grow the company revenue large enough to sustain the eventual service model.

Engagement

A second KPI that provides useful insights, is the engagement with Feelou as a brand. This can be tracked through multiple statistics: Social media likes and shares, website visits and more. Engagement is an important statistic in multiple ways. It can tell whether Feelou is in the mind of potential customers to eventually sell a bra to them, but it can also help remind customers to eventually pass on the bra to a friend or return it to Feelou.

Number of returns

The final KPI that can be important in this phase is the number of returns, and if possible the number of people passing on the bra to a friend. The initial target group is aimed to be sustainable frontrunners. By measuring their sustainable behaviour, a bar can be set for later customers that might be less sustainably minded. It also provides initial insights into the needed scale of the service model. To measure this KPI, cohort analysis (Reiss, 2011, CFI Team, 2022) could be useful. This can help relate the statistics to batches and therefore a Build-Measure-Learn loop (Reis, 2011) can be implemented to test hypotheses about customer behaviour.

Data insights

During the development of the bra, many interviews were done to improve the design. This shows that user-centeredness is an important factor for Feelou, and this could be continued throughout the further development of their business model.

In Horizon 1, it is important to understand whether used mediums are effective in stimulating customers to treat the bra sustainably at the end of its lifecycle. This can be measured quantitatively through KPI's, but also qualitatively by asking customers for feedback. This can be done in many ways, including surveys, interviews, single questions upon checkout etc. The qualitative questions aim at discovering customer intentions to increase the lifespan of the bra and how Feelou might have influenced these intentions.

Questions about EoL-interventions from Feelou that might be interesting in this horizon:

- What do you currently do with used clothes you do not wear anymore?
- What were your thoughts when you got the letter? Did you read it?
- What did you do with the letter that was attached to the bra?
- When do you think you will not need the bra anymore?
- Do you think you will remember what to do with the bra after it becomes obsolete? How?

Additionally, initial returns can be used for pilots to understand how the bras can and should be refurbished and resold. Different options can be tested for resale:

- Industrial cleaning before resale
- Refurbishing
  - Redyeing the bra to get rid of the washed black colour
  - Replacing the elastic band
  - Replacing worn metal parts if the paint is worn off
- Repair
  - Repair any stitches that are torn
  - Repair/replace cloth if holes are apparent
- Framing
  - Pre-loved instead of second hand or reused
  - Emphasis on positive environmental impact generated
  - Emphasis on price/quality: refurbished = as good as new

Resources

The research and ideation phase of this project provided multiple small scale, ready to implement solutions that could help in this stage of the business model. The main ones are provided here.

Letter

In the startup phase, solutions have to be found that are low effort and low investment, as there is no budget or time and releasing is worth more than waiting and preparing. An important result from the brainstorm was that customers want to be informed about their impact and the action is worth more than the reward for their sustainable action.

A very promising concept that is both low budget and high impact, is adding a letter to each sold bra that explains its ideal lifecycle to the customer. The style of this letter can have a major impact on the sustainability intentions of a customer in multiple ways. To improve the style, some parts of the SHIFT-framework were used as a guideline (White et al., 2019).

- Anthropomorphizing the bra: One of the brainstorm ideas was telling a personal story, as if the bra were alive. By writing the letter from the perspective of the bra, the user will grow more attached to it and treat it better (SOURCE).
- Informational: A major impact on sustainable behaviour is being told what is sustainable and what is not. Many customers do not know what the best option is. As Feelou has done research into the most sustainable options, they can help users by informing them what their options are.
- Prompts: The SHIFT-framework calls this letter a "prompt" (White et al., 2019), as it instructs the user what to do with the product before they are at the point where they need to actually do it.
- Implementation intentions: In the letter, the user could be asked to sign up for a reminder after a certain time has expired. This reminder could help them assess the usefulness of the bra and then decide whether it is still valuable to keep it or if it is time to pass it on.

- Positive emotions: By emphasising the positive emotions that will be felt when passing on the bra to a second user or returning it to Feelou, users can be helped to set an intention for when the bra is not useful to them anymore. This feeling is called the "Warm Glow"-effect (Giebelhausen et al., 2016, as cited in White et al., 2019).
- Make it easy: Finally, an important factor that was found during the brainstorm, but is also part of the SHIFT-framework, is making sustainable behaviour easy. By providing all necessary information in one letter and presenting it in a clear way, this should make it much easier for users to treat their bra sustainably. The letter could also provide a QR-code to the webpage of Feelou explaining the end-of-life options further.

An example of the letter can be found in image 35.

Invite users to pass on the bra

The most sustainable option for the bra when it is no longer used by the first customer, would be for a second user to have it. This has been elaborately explored with the RFD (Chapter 1.6). However, the Perceived hygiene paradox (Chapter 1.5) makes it hard to sell or give away a used bra, especially when worn during lactation. A good solution to extend the lifetime of a used bra would be to use the network of the first user to find the second user. In the research phase it was found that women would be more willing to wear a used bra if they knew the first user. By inviting customers to pass on the bra to a friend or family member after use, the chances of a bra getting a second life increase. As mentioned in the Service Blueprint and with the letter, an automated reminder email could help users to reflect whether they still need the bra and give them gentle push into giving it a second life when they do not use it anymore.

Passing on could even be stimulated by offering cleanup at Feelou before it goes to a second user. Although it requires an extra investment from Feelou, offering this can also give Feelou valuable data about the lifetime and wear of the bra. Probably not every bra will be given a second life, so the additional cost of this per bra would not be that high. During the first horizon, this cleanup/touch up can be done manually, just to measure the interest for it.

Return package

Another important factor in making sustainable behaviour as easy as possible, is providing users with a return package. Many ideas that would create a good return service were suggested during the brainstorms. Most were focussed on making the process as easy as possible. A return envelope can be delivered with the new bra, making it available to the customer immediately. However, this could risk the customer losing it. To prevent this, the return package could be attached to the letter or the letter could be printed on the return package, which would also save material.

Figure 35: Example of the letter.

PostNL sells a "Fashionpack" for €1,79/envelope (PostNL, 2022a), this envelope can be reused as a return package and fits through a letterbox. As the bra comes in a package already, reusing this package for the return process would make sense from both a material perspective and financially. These are not printable so the letter would have to be put inside, but it could instruct the receiver to hold on to the package for the return process.

At a certain volume, an "Antwoordnummer" might make sense, as it would make it free for customers to send packages to Feelou with their own package, so losing the original package is not a risk anymore. The prices of this are roughly the same as prepaid return packages (PostNL, 2022b).

Return label

To remind customers of returning their bra after use, a return label might help. As stated in chapter 2.3: Service blueprint, a return label is an effective way to regularly remind the customer of treating the bra sustainably during the usephase. Similarly to the letter, anthropomorphising the bra could help invoke a feeling of responsibility in the user. A message like "Return me to Feelou!" could help invoke this feeling.

As many women cut off labels from their underwear, the label could be sewn into the closing mechanism. This hides it when the bra is worn, but makes it visible the rest of the time. If enough space is available, a QR-code on the label (QR code tiger, 2022) could help any user to find the return page of the Feelou website. This also makes it much easier for later users to return the bra if they got the bra directly from a previous user. The minimum recommended size of a QR-code is roughly 2 x 2 cm (Schulfer, 2020).

QR-code

A QR-code is a compact way to refer to a website that is increasingly used in the fashion industry (QR code tiger, 2022). In the brainstorm, it was mentioned as an option to make responsibly treating the bra at the end of the usephase easier. The QR-code can refer to the return page on the Feelou website, therefore making (informing about) the return process much easier. This QR-code can be inserted in all places that invite users to return their bra, including the letter, the return label and other communication.

Figure 36: This image refers to https://feelou.co/return.

As it is relatively simple, a small version of it could be sewn into the bra (figure 36).

Positive messaging

Another quality that rose from the brainstorm is positive messaging. Multiple participants emphasised that a positive message is important to them when companies try to sell them sustainable products. O'neill & Nicholson-Cole (2009) say this too, they found that imagery and icons invoking fear tend to attract more attention, but inspire less action than more positive images (figure 37). Furthermore, future effects of climate change are uncertain, and communicating these through a positive frame by showing how negative effects can be avoided raises a feeling of self-efficacy (Morton et al, 2011). If a customer believes they can make a difference with their actions, chances are better that they will change their behaviour (Peattie, 1999, 2001, as retrieved from White et al., 2019). By showing people both the urgency of climate change and how they can influence it, climate pessimism is avoided and action is inspired.

Positive messaging therefore consists of:

- Encouragement: "Every action counts"
- Forgiveness: "You do not have to be perfect"
- A focus on self-efficacy: "This is what you can do"
- Communicating the positive impact their behaviour is having: "Every reused bra saves … "
- Gratification: "Thank you for helping us make a positive impact on our planet"

Figure 37: Balancing optimism with realism.

Qualitative data gathering

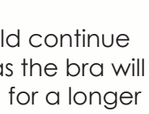
As said in the Data Gathering chapter of this horizon, Feelou has done much user research while developing their product. As user-centeredness has shown to be an important factor in increasing revenue (SOURCE), it would be worthwhile to continue this effort later throughout the business model. This would not only improve the design from a consumer perspective, but it can also help in finding ways to make the business model more sustainable. Analysing what incentives for sustainable behaviour work for customers and how they can be helped to behave more sustainably can increase the sustainability of the Feelou ecosystem for both customers and Feelou itself. It would be valuable for Feelou to think about the scaling of this knowledge gathering process in the future.

In the first horizon, Feelou should continue interviewing (potential) users as the bra will be used on a larger scale and for a longer timespan. Additionally, Feelou should ask users about the circular (return) system:

- What do they think about the letter? Is it clear? Does it help? Do you still have it?
- How do they experience the return process? Is it easy?
- How did they feel afterwards? Was it worth the effort?
- What can Feelou do to make it a more positive experience?

Collecting experiences of customers about this process helps improve the service experience which increases the willingness to use the service. This in turn increases impact, which helps Feelous image as an ethical company. Therefore, qualitative data gathering could be a key to multiple positive reinforcement loops increasing brand image and eventually revenue.

Website: make it easy

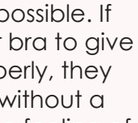


Cluster 3 in the brainstorm (chapter 2.2) emphasised making the return process easy. As the results in this cluster tended to be quite broad and general, the Service Blueprint (chapter 2.4) was used to gain insight into the contact points between Feelou and the user in the return process. The website is a central point of information on the return process. Reminder emails, QR-codes, searches on search engines, all of these can refer to a page on the Feelou website informing customers about the return process.

Therefore, finding relevant information on this page should be as easy as possible. If a customer wants to return their bra to give it a second life or recycle it properly, they are already putting in an effort without a direct effect on them except the feeling of having done something good. This feeling easily fades when a customer has to go to lengths to dispose of the product properly, resulting in the bra ending in the trash anyway.

To prevent a user from dropping out in the process of returning their bra, the webpage explaining and guiding them through the return process should be found quickly. The call to action for returning the bra should be emphasised, so users can skip to the return process immediately if they want to. By explaining the process both visually and textually, the user can take time to understand the process according to their interest. The visual can provide a rough understanding in seconds, while the text would explain it further. Providing this information can increase motivation for the user to go through the return process, as it will always require an additional effort compared to throwing the bra away.

Social media: inspire



The social media Feelou uses to communicate their brand to customers can inspire people to think about important topics. It can also serve as a reminder to do something with their unused bra, so posts activating users could make sense a few months after launching the first batch. The social media presence should focus more on inspiring and reminding, as it has a much broader audience. It shows what Feelou stands for as a brand, while the website helps users with specific goals. Therefore, posts communicating impact and other important topics for Feelou can contribute to the brand associations customers have, improving the image of an ethical brand.

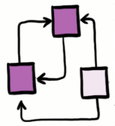
Horizon 2: Scale up

Main task & scale indicator

At the second horizon of the Roadmap, the first revenue has been made and it is time to invest part of it to set up the repair and quality control system, therefore opening up the inner loops. As the first batch(es) have been sold and the scale of returned used products increases, the processing of these products can become more automated. Furthermore, first pilots can be done in methods of data gathering to measure impact.

As shown in horizon 1, the initial target group is roughly 1.500 people. However, this can grow to 14.000 rather quickly with the early adopter group. Returns are estimated to be roughly 5%, based on estimations for other companies with a return system (appendix H1). The scale of the return system at this point would be roughly 200 to 2.000 bras per year. Processing 2.000 bras per year is estimated to be the work of 1 fulltime employee, taking 156 hours per month (appendix H2).

The number of bras that are returned will now be larger than the amount needed for testing, so setting up a process to handle returns is necessary to prevent wasting valuable products and materials.



Business model focus

Now that the sales model provides an Engine of Growth (Reiss, 2011), space starts freeing up to develop the circular side of the business model (figure 38). In the Butterfly Diagram (Ellen MacArthur Foundation, 2013) and the Resource Flow Diagram (chapter 1.6), important steps in extending product lifetime and circularity are Repair and Reuse. These options keep the product mostly intact and therefore much value can be captured.

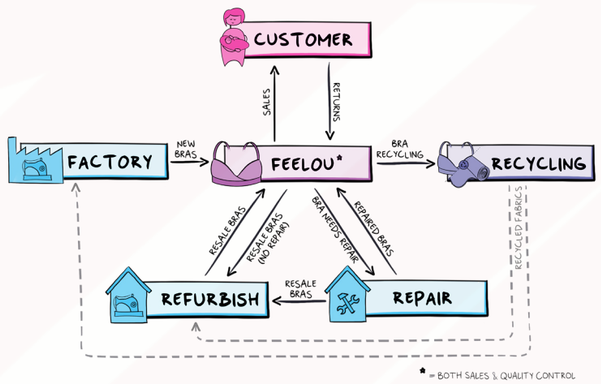


Figure 38: A systemic visual of the business model of Feelou in horizon 2.

Initially, the returns were mostly useful to gain insights for redesigns, estimating the interest in returning used bras and for testing purposes. However, as the scale of returns increases, the repair and resale of products can be set up. This means the returns side of the business model can be handled by people other than the founders and a process has to be set up to do that.

At a scale of 200 bras per year, it was estimated that processing would cost a total of 16 hours per month, which would increase linearly as the number of returns rises (appendix H3). The cost of this process would be €20,79 per bra excluding logistics costs of receiving and reselling, this could be an additional €8,- (PostNL, 2022c) if done fully through a delivery service. Most of these costs would be from labour, as shown in figure 39.

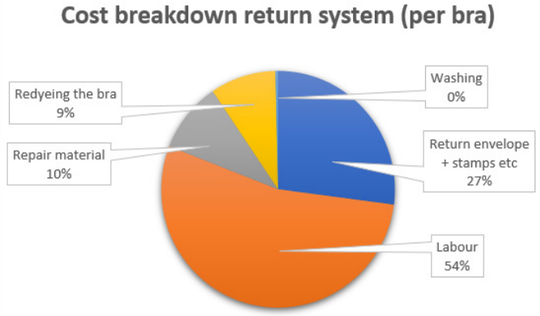


Figure 39: Cost breakdown of the return system.

As the time estimates were made conservatively, it might be possible to bring back this cost. However, the cost is comparable to producing a new bra, although the value of a previously used bra is significantly lower because of the Perceived hygiene paradox (chapter 1.5). If this system were to be operated at break even, any additional costs could be covered by the first user sales as that revenue will be significantly higher. The value of this service system is mostly environmental and therefore increasing brand value (Melo & Galan, 2011).

KPIs to track

Engagement, returns, repairs

At this point, tracking customer engagement and returns is still relevant to gain insights into the circularity of the company and customer interest. As repairs will be done more often, keeping track of these could help gain insight in the growth of the service model.

Second users (repairs, refurbishments)

Furthermore, the number of second users is growing too. Tracking the number of second users is an important factor in the sustainable impact of Feelou and the circularity of its business model. Part of the campaign of Feelou would be stimulating passing on the bra to friends or family, so it might be hard to track this number. However, offering quality control, repair and refurbishment before passing it on might be a way to both increase the bra lifespan and gain useful data on this KPI.

Main goal of KPIs in horizon 2

The most important reason to keep track of these KPIs is to estimate impact and compare the service side of the business model to the regular sales side. Improving the service side is a requirement to increase the bra lifespan and become circular, but it depends on revenue from the sales side because a new bra is worth significantly more than a used bra.

Data insights

As the scale of used product returns increases, Feelou will have to increase their efforts in the second-hand (pre-loved) market too. The Perceived Hygiene Paradox will have a strong effect on the image of pre-loved products in the eyes of the customer, so it would be valuable to test different options of selling these products. The data insights from horizon 1 should give guidance as to which resources would be most valuable and how they can best be set up. This can be expanded into a larger scale in horizon 2.

Additionally, establishing a connection with the previous user might be a valuable way to increase the value of the bra for a second user. Pilots can be set up that establish different levels of connection with the previous user and test whether this improves the sales of pre-loved products. The resource "Story from a previous owner" goes deeper into possibilities surrounding this value capture strategy.

Resources

In horizon 2, the first resources consider the service side of the circular business model. These are quality control, deep cleaning, repair shop and possibilities for pre-loved products. These are necessary parts of the service blueprint that improve product lifespan. After that, some resources are discussed that could improve these services.

Quality control

All returned bras that arrive at Feelou need to be checked and registered to prevent losing track of them in the service system. To do this effectively, a standard checklist could be made and any defects should be mapped visually to make it clear where repairs are needed. Adding a serial number would also be recommended to track the bra through the service system. At quality control, it should also be clear whether a product has a destination (for instance the current or new owner), or whether ownership of the product stays at Feelou afterwards, as that affects choices for processing.

At first, this might be done more loosely as employees working at quality control and repair/refurbishment will overlap initially. As the number of bras within the service system grows larger, the process needs to become more streamlined.

It might also depend on the stock of resellable bras that Feelou has already whether time and money will be invested to repair a bra, because there is always a chance that the pre-loved bra will never be sold. If the bra design is modular enough, any parts that can be reused for repairs could be removed and the rest of the bra recycled. These choices should be made and clearly documented for all arriving bras.

Deep cleaning + touch up

To deal with the Perceived Hygiene Paradox, it is important that buyers of pre-loved bras are convinced the bra is properly cleaned. Industrial cleaning of the bra would be a first step in this. But convincing the customer to buy a pre-loved bra might take more effort than cleaning it, as the paradox is about a feeling of hygiene, not only the actual hygiene.

To combat this, a touch up of the pre-loved bra might be necessary. The bras could be redyed to give them their original colour back, as it might have faded a little. Some of the elastics might have worn and be in need of replacement. These processes require an investment, so it is important to judge what is needed for the incoming bras and test the results with customers. To find which options work best, pilots should be done in which multiple options are tested with customers. These can test whether redyeing is worth the effort and which parts really need. to be replaced.

Repair shop

At the start of this horizon, different processes have been set in motion to make the service system of Feelou circular. However, these focus only on the easiest steps to improve the lifespan of bras, namely reuse by direct circles and recycling. In the second horizon, enough returns and revenue should have started building up to invest in the repairing service. This is an important part of the Resource Flow Diagram, as it lifts used bras up the value ladder again, increasing both value and lifespan of bras.

To make the repair shop effective, repair parts should be available and repairs should be as easy as possible, decreasing time spent per product. As the repair shop becomes operational, knowledge can be gathered on how bras can be more effectively designed for repair.

Another option would be to outsource this process, but not a lot of partners exist that do this yet. It might also be less integrated into the Feelou ecosystem than renewing the bras in house. The Renewal Workshop (https://renewalworkshop.com/) is an example of a workshop that takes in clothing that can be repaired and cleaned to be sold again.

As not many customers will actually use the service, a 1x free repair could be offered to help support sustainable behaviour. It could even be offered to people passing on the bra to a friend or family member, as it provides useful data about the lifecycle of the bra. In calculating the sales price of the bra, this would not add much to the price of the bra (See figure 40). The numbers used in these calculations are rough estimates, especially the cost of production. Even so, the estimates of the refurbishment and repair costs are relatively low compared to the cost of production, because the cost is spread over multiple sales as not all bras are refurbished or repaired.

Operational cost (per new bra)	Amount	Unit
Cost of production	€ -15,00	€/bra
Free refurbishment with pass-on	€ -4,16	€/bra
Free repairs	€ -1,66	€/bra
Cost of resale system	€ -	€/bra
Total PSS cost	€ -20,82	€/bra

Figure 40: Cost breakdown (for calculations see appendix H4).

"Pre-loved" possibilities

Resale is going to be a challenge for Feelou, as the value of the bra decreases a lot after it is discarded by its first user. However, from a sustainable perspective, it would have the biggest impact on the lifespan of the product. Therefore, it might be worth it to invest a little in this part of the service model as it would also increase brand value. It would show that Feelou is an honest brand and is willing to invest in causes it believes in. That being said, there are two ways Feelou could sell pre-loved bras.

Firstly, Feelou could sell them on their own webshop. This would be the most valuable option for Feelou, as it directly shows what Feelou does to become a circular company. These could be the highest value bras from the return flow, they could also be the ones with the "Story from a previous user"-idea implemented to them.

Feelou could even offer a discount on a pre-loved bra if someone buys a new one to promote the pre-loved program. The pre-loved bra might be used less than the new bra, but if the alternative is buying two new bras and the pre-loved bra is going to waste, this would still be a positive impact. If this is implemented, talking to users to make sure there are no unintended consequences is advised. Having both a new and a pre-loved bra could lead to some interesting assumptions and behaviours in the mind of users that are worth exploring.

Secondly, the used bras could be either sold or donated to a thrift shop or other sales partner, depending on the situation and the condition of the bra. This raises the question whether Feelou would invest in industrially cleaning or even touching up these bras beforehand, which will raise the chances of the bra being sold there. These partners could also have their own cleaning program which would probably be at a larger scale, so industrial cleaning might not be necessary. This all depends on which partners are found for the pre-loved program, so no definitive best answer can be given here.

Activity = Reward

Many companies offer discounts or gifts for returning products, which can be an effective way to increase sustainable consumption. However, these external incentives can also suppress intrinsic motivations for sustainable behaviour (Bolderdijk & Steg, 2015). As soon as the external incentive is removed, the behaviour could decrease (Cairns, Newson and Davis, 2010, as retrieved from White et al., 2019). External rewards work, but it might be a case of good behaviour for the wrong reasons.

This research matches well with a key insight from the brainstorm session. The participants stated that the activity of returning or passing on a bra should be a reward in itself. It should feel good to give a product a second life, and it should be clear that what a user does is actually sustainable. Different options of rewards for the behaviour like discounts or vouchers were examined, but participants emphasised positivity and rewards contributing to the "warm glow"-effect (Giebelhausen et al., 2016, as cited in White et al., 2019) in the ideas and input they proposed. To increase this positive effect, the impact generated by their behaviour should be communicated clearly and concretely, preferably linked to a direct effect on them.

Communicating this message could look like: "Thank you for returning your used bra, the next mom using this bra will appreciate it!"

Attached to the return process webpage could be an infographic showing some of the statistics of the direct impact:

- ..% of returned bras are given a second life
- Recycled bras can be turned into …
- Giving a Feelou bra a second life saves .. L water and .. kgCO2
- This means reusing 100 bras has an impact comparable to …

Personalise

Attachment to a product can also grow by personalising it, increasing its lifespan (Bakker et al., 2014). This idea was also brought up in the brainstorm session a few times. This could go hand in hand with the repair shop. A user could be offered multiple solutions to the part that needs to be repaired, making it possible to have a say in what the product will look like afterwards. This could be in the form of coloured stitches and patches, showing clearly that the product has been repaired.

Cristian Siriano has designed patches for second hand clothing to make owners proud of their thrifted clothes (Wasilak, 2020). Following this idea, a patch could be added to a repaired product to show it was given a second life. This would emphasise that the product has been repaired and it could make the user proud of their sustainable behaviour.

Story from a previous owner

In the interviews (appendix C) and brainstorm session (appendix D), it was found that the willingness to use a pre-loved bra would increase if the new owner knew the previous owner. Therefore, if it is not possible to let a user pass on their bra to a family member or friend, another way could be found to connect these users a little better. As the amount of returns increases, more impact could be generated with this type of value creation. It increases the chances of a customer being willing to buy a pre-loved bra because it improves the brand experience (Dwivedi, Nayeem & Mursed, 2018). Furthermore, encouraging a stronger relationship to the product adds emotional attachment, therefore increasing sustainable behaviour (Mugge, Schoormans & Schifferstein, 2008, Page, 2014).

At the point of resale, it should be clear that the second user will get to know the previous owner a little better to increase the value of the product. However, the exact information might be left as a surprise.

An option would be to ask users to share something about themselves when returning the bra. Within the return process, users could be asked to answer three questions and the answers to these questions can then be passed on to the next user. When the next user opens their package, it could have the answers to the questions in there as a surprise.

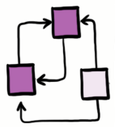
Horizon 3: Ideal business model

Main task & scale indicator

In an ideal business model, data about the functioning of the service model is available and tests for improvements can be easily implemented. The focus of this horizon is to smooth out this process of data gathering and test implementation, in order to improve the circularity of all resource streams (figure 41). This can be done with the Build-Measure-Learn loop, which should be gone through in quick iterations (Reiss, 2011).

The scale of the return system at this point has exceeded 2.000 bras per year. For the complete service system (quality control, repairs and refurbishment), it is estimated that at least 2 employees are needed. This requires better coordination and the systemic approach that has been implemented throughout the growth of the service system.

The sustainable products market is growing rapidly, with products marketed as sustainable growing up to 6 times faster than the average market (Gatzer & Magnin, 2021). Senior executives are lagging behind with this trend (Petro, 2022), which opens up a large market segment to be filled in by companies that do see the importance of sustainable products. Therefore, the target group size of horizon 1 and 2 will organically grow with Feelou as more people within Gen Z start to have children.



Business model focus

Most aspects of the service model have been set up at this point in the Roadmap and the number of sales and returns will be increasing exponentially. To see whether these system parts are working properly and where improvements can be implemented, data needs to be collected on their functioning. This horizon should focus on improving the data collection process and testing hypotheses on ideas to improve circularity. The Build-Measure-Learn loop from Reiss (2011) could be an important framework to set up this process.

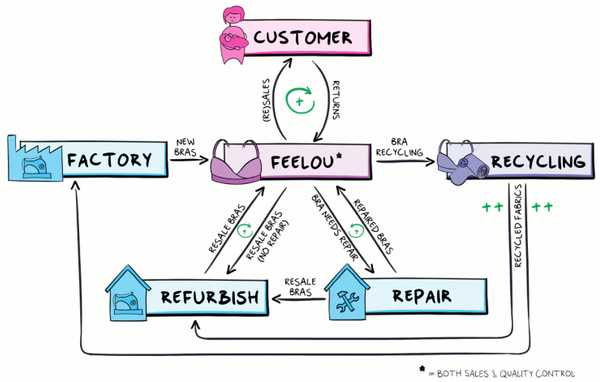


Figure 41: The final circular business model.

KPI's to track

As most aspects of the circular service system have been set up now, growth of the business model shifts from setting up new layers to improving them. Therefore, KPIs in this horizon are centred around the three pillars of a circular business model as mentioned in the Design brief (chapter 1.2).

The first pillar is "Closing the loops", and focuses on using recycled and recyclable materials. Additionally, Feelou can focus on this pillar by increasing the percentage of returned bras and improving the quality at which they are recycled.

The recycling industry for clothing is currently mostly based on downcycling, which brings us to the second pillar: "Slowing the loops". Here, many efforts have been done in previous horizons, of which the effectiveness can be measured in multiple KPIs: the number of repairs, returns, second users, maybe even remanufactures if parts of discarded bras can be used in new bras. A KPI that puts all of these together would be the average product lifespan. The longer a bra is in the Feelou system, the longer it is reverted from the waste pile.

The final pillar, "Inner loops over outer loops", puts the KPIs in perspective. Finding a second user for a bra would be prefered over using its parts in a new bra. The longer a user can use the bra without repairing it, the better this is for the circularity of the system.

In total, these KPIs aim to measure the circularity of the Feelou service system. This should always be related to the number of sales, as chances are that only part of the sold bras ever enter the service side of Feelous business model. By using cohort analysis (Reiss, 2011, CFI Team, 2022), Feelou will be able to relate the number of sales to the number of bras entering the service system and eventually being recycled. Improving this ratio should be a priority for Feelou, as it increases control over the lifecycle of their products.

Data insights

As the number of employees and stakeholders within the Feelou ecosystem grow, sharing information becomes harder, while employees have a big effect on the circularity of the Feelou business model. To help employees make the best decisions for the sustainability of the Feelou bra, they need to be not only informed, but also inspired to increase the quality of the bra. Previous horizons focussed on inspiring customers, which will have brought much knowledge to Feelou that can be used to also inspire employees internally.

By facilitating conversation and knowledge sharing within the company and keeping information about circularity transparent, employees can make informed decisions. It might be better to use the parts of a bra to repair other bras if there is a stockpile of pre-loved bras that still need a new owner. However conversely, a bra that needs a little extra attention to be patched up might be worth repairing if the sale of pre-loved bras goes well. These kinds of dilemmas are easier to decide on if an employee knows how other parts of the service system are doing.

Resources

Data management is central to horizon 3. In horizon 2, the main parts of the circular business model are set up. Horizon 3 focuses on improving all resource flows in the system with the goal of increasing the product lifespan and the circularity of the business model. To improve this, data needs to be collected and processed. This helps to gain insights into where the system can be improved. The resources in this horizon aim at collecting data and improving resource flow with the data gathered.

Data gathering & impact measurement

The process of gathering the right data to improve the service model should be a priority in horizon 3. This forms the basis of other resources in this horizon, as the data collected can be used to communicate and improve impact in different ways. The database increases the effectiveness of going through the Build-Measure-Learn Loop (Reis, 2011). In the Build-phase, different options are designed and measurements of the effect of these options are included in this design. Then in the Measure-phase, data is collected that can be compared between batches in the Learn-phase.

Forms can be made that make filling in the data easy and that are clear to employees so no misunderstandings arise. These forms can be used to gather data within the service model about quality control and repairs, but they can also give customer insights by adding brief questions in the return system.

Some statistics might be quite hard to get a grip on. For instance, finding how many users pass on their bra to a friend or family member can be a challenge if the bra does not come through the Feelou system before arriving at the second user. Most of these challenges will be a balance between investment and impact or data accuracy. Letting customers send the bra back to Feelou before passing it on and refurbishing it might bring in more data about the passing on scenario, but it is also quite an investment for Feelou. Another option would be to ask customers at purchase if Feelou can send them a reminder email after a few months, asking them what happened to the bra. Less customers might be attracted to do this, but it would be cheaper than offering free refurbishment.

Database design

To build a database that tracks all bras and can calculate impact throughout different batches and other tests, a digital version of processes within the business model needs to be built. In that digital version, data can be inserted about different variations and bras can be linked to users. By adding impact data from processes and materials to the model, the total impact of the system can be calculated and KPIs can be measured.

The database has some important features (figure 42). Firstly, both users and the bras they bought get an ID. This is where data of a specific user or bra is stored. In the data about the bra, there is also infor-

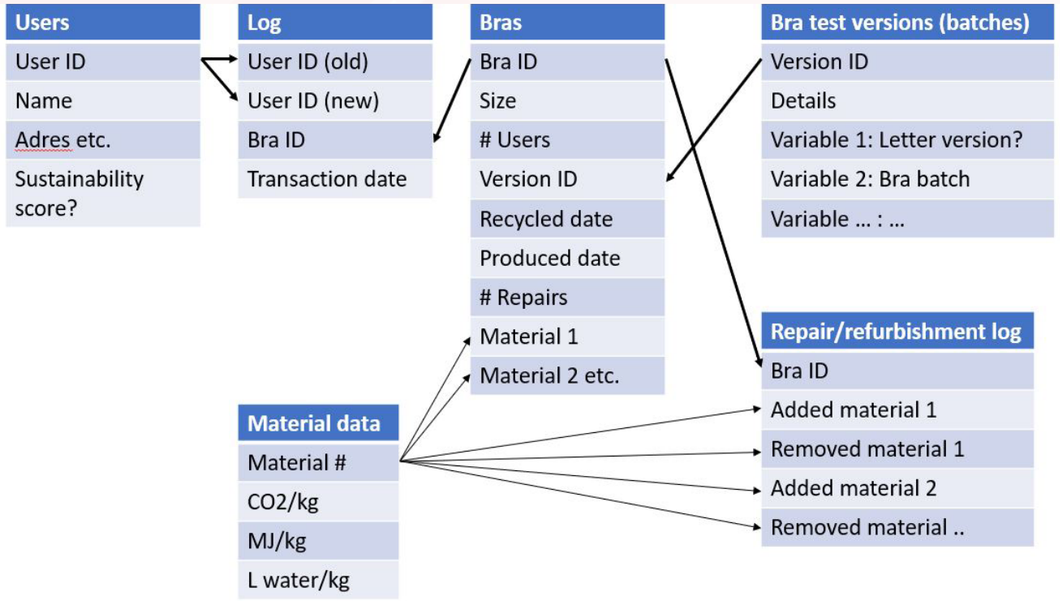


Figure 41: The final circular business model.

mation about which tests or iterations this specific bra is part of. This data is important for the cohort analysis (Reiss, 2011, CFI Team, 2022).

Secondly, a log system stores all movements of bras within the service system. This is where bras are connected to users. The log also functions as a counter for the number of users per bra. Each time a transaction is logged, the bra data adds one user. In a similar manner, bras that go through (re)manufacturing or recycling can be tracked throughout the system. Any changes to the bra (for instance repairs) can be added to the specific bra ID.

Finally, KPIs can be measured by looking at specific information in the logs. For instance, if someone would want to see how many bras were saved by repairing them instead of throwing them away, they could ask the database to look at the repair log and see how many repairs were done.

Teaching workforce to improve lifespan

Inspiring employees to improve their impact within the company can be done according to the SHIFT-framework too. Invoking positivity by celebrating milestones can help employees to be more conscious of the impact they are making with their job.

To improve the effectiveness of the data gathering, the forms for the database should be clear and easy to fill in and employees should know how and why the data is used. This does not need to go too in depth, but a general idea is important, as knowing how the data is used makes the task of filling in the necessary forms less a chore and more about generating impact data.

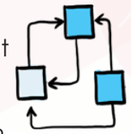
Inform about impact

To encourage customers passing on and returning their bra, it is important that they are informed what the impact of that behaviour is. This stimulates self efficacy, a feeling of being able to have an impact with their actions. It makes the results of their behaviour less abstract, as it bases the results in measurable impact instead of trust or hope. To make this impact clearer, the effects should be communicated at a relatable scale: What would be the effect if 10 bras are passed on to a second user?

Social influence can also play a role here, as people are more willing to perform sustainable behaviour if they know that others do it too (White et al., 2019). This requires informing about impact on a larger scale: How many people have passed on their bra? How much fabric has been saved that way and what is the impact of that?

To solve this challenge, an infographic balancing the local, more individual impact versus the impact of the full service model is advised. In this way, both social influence and influence on the individual can be used to promote sustainable behaviour.

Track bras through the system



To gain more information about the lifecycle of bras, it is helpful to be able to track individual bras through the service system. Bras could be given a serial number that can be found either with a small QR-code on the product or through an RFID chip inside it. RFID chips can be washable and sewn into clothing (Roger, 2021) and automate the process of scanning and identifying the bras that come through the Feelou service system.

Tracking these bras enables the collection of more data about batch performance and lifetime extension, as it shows exactly what has been done to each specific bra within the service system. It also helps measuring batch performance, as different iterations can be tracked more easily and therefore more accurate tests and a higher amount of them can be done to improve the lifetime of bras.

Community

At the scale of horizon 3, Feelou could also join or create a community of like minded people and host events for customers to meet each other. As the target group of Feelou is quite narrow, many mothers might come across the same challenges while improving their behaviour to live more sustainably. Facilitating a conversation between these peovple can have a big impact, as knowledge can be shared and the feeling of having to do everything alone is reduced. It is also a way for Feelou to get to know their customers better, which will further improve the product and service system.

An example of such an event could be an annual impact event, where Feelou can communicate their impact with their customers. Some ethical companies do this already, for instance Tony's Chocolonely (Tony's Chocolonely, n.d.). During such an event, Feelou could facilitate workshops, give lectures or even empower visitors to think about a more sustainable world.

2.7 Conclusion

During the research phase, the theoretical service system for the Feelou pregnancy bra was analysed with the Butterfly Diagram (Ellen MacArthur Foundation, 2013) as a template. This resulted in the resource flow diagram (RFD), a valuable tool to analyse resource flows and stakeholders within a circular business model. As this model describes a theoretical circular system, it could be used for any product, not just the Feelou bra.

The design goal for the conceptualisation phase, was to solve the three main paradoxes that arose from the conflicting values in the circular system, being the Business Model Paradox, the Perceived Hygiene Paradox and the Circular Impact Paradox (chapter 1.5). Analysing the system through the RFD model provided valuable insight into the challenges that the paradoxes raised. Various methods helped solve these challenges, and through the Roadmap (chapter 2.6), priorities for development at different stages are proposed and resources to solve the paradoxes are provided.

Business model paradox

While theory suggests that a lease model would be more effective to build a circular business model, the interview with Mudjeans, a pioneer in the lease model for clothing, explained the challenges of this business model (appendix F, discussed in chapter 2.3: Service blueprint). As the Perceived hygiene paradox was a big challenge already, that would only get more complex with a lease model, it was decided that a sales model would be more appropriate. This meant that more effort had to be put in to convince customers to return their bras after the usephase, but effective small scale solutions were possible as can be seen in the Roadmap.

Perceived hygiene paradox

There is no single solution for the Perceived Hygiene Paradox, as perception can be influenced by many emotions. That being said, it is possible to reduce its effect on customer decisions. The solutions can be placed in two categories. Firstly, by increasing the emotional value of the bra for later users. This can be done by adding a story to the bra, either about its sustainability or about previous users, establishing a better connection to the product. Secondly, convincing additional users that the bra is properly refurbished. Industrial cleaning and redyeing are examples of this.

Circular impact paradox

To manage growth of impact along growth of revenue, the model in figure 43 was proposed in the introduction of the Roadmap. It visualises the balance between the sales model that creates revenue and the service model that will need investment. In turn, the service model increases the brand value of Feelou as it enforces the image of an ethical brand: Feelou puts in an extra effort to become a circular company and takes responsibility for the waste it generates. This increased brand value will have an effect on the sales model too, as customers will be more inclined to buy a bra if it comes from an ethical company.

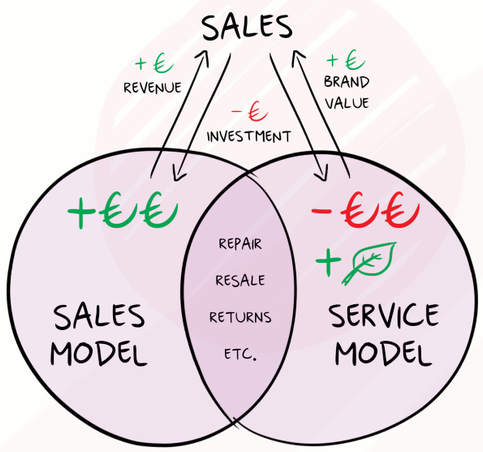


Figure 43: Systemic visual of the balance between the sales model and the service model.

With the proposed solutions for the three paradoxes, sustainable development of the business model of Feelou has been made possible. Throughout the different stages of the Roadmap, appropriate resources are provided that fit the size of the service model at that time. The service blueprint provides a more detailed visualisation of the circular business model as it can eventually be implemented.

Storytelling

Specifically for this project, the Perceived hygiene paradox was an important challenge that needed to be solved. The main insight in solving this paradox was that the value of a pre-loved bra is highly influenced by emotional value. As this value can be influenced by many factors, there is a wide range of possible solutions to increase emotional value. Most solutions focus on the story behind the bra with different emphases. The storytelling can focus on the sustainable value of the bra, the bra itself or the previous owner.

These solutions could be adapted to other product types too. This solution could work well in product categories where the customer places high value on owning a new product and where pre-loved products lose most of their value. By increasing the emotional attachment to these products and emphasising the sustainability of reuse, customers could be persuaded to give these products a second life.

2.8 Discussion & recommendations

This report aimed to gain a better understanding of designing a PSS for a circular pregnancy bra. Many challenges were found and suggestions to solve them were proposed. However, in the scope of this research, it was not possible to dive deeper into some topics that might still be relevant during development of this business model. Therefore, some topics are discussed here that might inspire further research.

Methodology

During the research phase of this project, the Butterfly Diagram worked well as a starting point for analysis. It inspired the resource flow diagram, which provided a clear overview of all aspects of the system. However, the conceptualisation phase was less structured. This phase started with gaining more customer insights with a participatory brainstorm. This brainstorm, combined with knowledge from the research phase, provided enough insights to develop a concept for the business model. This business model had many building blocks, which made it hard to keep an overview of all possibilities and their interactions with each other.

To gain a better overview of the full system, a service blueprint was made. Although this provided a better overview of a possible service system, it was still just one option that was iteratively designed. The roadmap provides steps to work towards this service system, growing it from the startup phase towards a larger company with useful resources accompanying each step.

Even so, the final deliverable is a rather open concept. This may lie in the fact that this project was done for a startup and aimed at developing a business model, both factors contributing to a much more open design process than usual in product development. It could also be that other models or methods would have provided a better overview. Better researching methods for business model development in startups could have helped to have a smoother transition to the conceptualisation phase.

Interviews

During this project, many conversations with the potential target group took place. However, none of these had an elaborate interview guide due to the ad hoc character of these conversations. At most, some topics to discuss or possible questions were written down beforehand. These conversations inspired much further research and many of the ideas posed by interviewees were found back in research. Even so, to improve credibility of the knowledge surrounding the target group, it would have been better to set up guides. This would increase reproducibility, which is essential in doing good research.

Development of knowledge

Even though solutions to the paradoxes were provided, many assumptions were made by drawing inspiration from similar situations and relevant research, not from the specific business model itself. As the company is still in its startup phase, pilots need to be done and data needs to be collected throughout development to test these assumptions and gather more knowledge on the subjects. The Roadmap serves as a guiding tool for different phases in this development, but as the company grows, more data becomes available and strategies can be fine tuned to fit better in their future context.

Consumption rewards as an incentive

To inspire customers towards sustainable consumption, a multitude of incentives were proposed that eventually lead to a longer lifespan for the bra. An important incentive that was left out in the Roadmap, is providing discounts or gifts (see horizon 2 resource "activity = reward" in chapter 2.6: Roadmap). Research shows that this incentive does not inspire intrinsic motivation to change behaviour, but instead provides an external incentive (Bolderdijk & Steg, 2015, Cairns, Newson and Davis, 2010, as retrieved from White et al., 2019). Even though it might not be the right incentive, it can still be effective and many companies use financial incentives to promote sustainable behaviour. Moreover, the second largest cluster from the brainstorm, cluster 2: Consumption rewards, consisted solely of these kinds of rewards. Therefore, this is a powerful incentive that should be considered carefully. It can be a last resort option if the provided incentives inspiring intrinsic motivation turn out to be ineffective and the size of the service system lags behind when compared to the amount of sales.

Biocycle vs Technocycle materials

Furthermore, this project focused mostly on a circular business model for the bra, while an important part of a PSS is the product itself. During this project, it was discovered that the clothing recycling industry only recycles a small percentage of fabrics into new woven fabrics. Much material is downcycled and eventually ends up as waste. Therefore, material used for production of the bra is also important to become circular. It is advised to look into biocycle materials because of the current state of the recycling industry, as cascaded use is more natural for these materials. However, this was not the scope of this project, so further research is necessary.

Social development

In contrast to environmental aspects, an important aspect of the business model that should have more attention is social development. As this report focused on increasing the lifespan and circularity of the bra, which are material aspects of sustainability, this social side of sustainability did not get as much attention as the environmental side. However, according to Raworth (2017), it does form the inner boundary of Doughnut Economics. This model is a system that helps companies gain an overview of their impact on the 3P's: People, Planet, Prosperity (Elkington, 2018, originally coined in 1994). Social development is also considered in eight of the seventeen Sustainable Development Goals of the UN (UN, 2015). Therefore, it forms an integral part of corporate social responsibility (CSR) (Bowen, 1953) and should be considered in the growth of the company. All of these frameworks are widely used to talk about sustainability and all attempt to describe the balance between the concerns of the company, humanity and the planet.

MAIN INSIGHTS OF THIS PROJECT:

- CONCEPTUALISATION COULD HAVE BEEN PLANNED BETTER, POSSIBLY BETTER FITTING METHODS FOR BUSINESS MODEL DEVELOPMENT IN STARTUPS CAN BE FOUND.
- BETTER INTERVIEW GUIDES COULD HAVE PROVIDED MORE INSIGHT IN CUSTOMER VIEWS ON SUSTAINABLE CONSUMPTION.
- TO FURTHER VALIDATE CONCEPTS RESULTING FROM THIS PROJECT, PILOTS SHOULD BE DONE.
- CONSUMPTION REWARDS ARE WIDELY USED IN THE INDUSTRY, THEY COULD BE CONSIDERED IF OTHER CONCEPTS PROVE LESS EFFECTIVE THAN EXPECTED.
- BIOCYCLE MATERIALS COULD DRASTICALLY CHANGE THE BUSINESS MODEL BUT WERE OUTSIDE THE SCOPE OF THIS PROJECT.
- SOCIAL DEVELOPMENT IS AN IMPORTANT ASPECT OF SUSTAINABILITY, BUT WAS MOSTLY IGNORED IN THIS PROJECT AS THE DESIGN BRIEF FOCUSED ON LIFE EXTENSION OF THE PRODUCT.

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4. Appendix

Appendix A: Design brief

Design Brief – circulaire (zwangerschaps)bh
Bedrijf: Feelou / www.feelou.co
Contact persoon: Noor Figdor / noor&feelou.co

Achtergrond
Elk jaar worden er in Nederland 165.000 vrouwen zwanger. Wij zien dat vrouwen gedurende hun zwangerschap meerdere bh's kopen (uit interviews met 45+ vrouwen), waarvan een groot deel uiteindelijk wordt weggegooid. Tijdens en na een zwangerschap veranderen borsten voortdurend en daarom moeten vrouwen steeds op zoek naar beter passende bh's. Traditionele zwangerschapsbh's zijn niet ontworpen voor deze veranderingen. Ze richten zich vaak op één fase van de zwangerschap of kraamtijd.

Feelou richt zich daarom op de ontwikkeling van een bh voor (nieuwe) moeders: een bh die meegroeit én - krimpt met het ritme van het vrouwelijk lichaam. Zo maken we het kopen (en weggooien van) bh's in verschillende soorten en maten overbodig. We nodigen vrouwen uit de bh terug te sturen als ze hem niet meer nodig hebben en dan kijken we of we de bh een tweede leven kunnen geven. Wanneer volledig hergebruik niet meer mogelijk is kijken we welke delen geschikt zijn voor individueel hergebruik en zorgen we ervoor dat de overige delen op de juiste manier gerecycled kunnen worden.

De opdracht van Feelou richt zich daarom dan ook op de volgende punten:
- het circulaire (her)ontwerp van de bh;
- de kansen voor het verlengen van de levensduur van de bh, én
- het terugname-, ontmantel- & recyclingproces.

Complexiteit
In 2022 lanceert Feelou een eerste versie van de bh op de markt. Deze versie is uitgebreid getest op comfort en functionaliteit. Er is voor deze eerste versie gebruikt gemaakt van bestaande materialen zoals fournituren en stof. Ondanks het innovatieve ontwerp zou Feelou zich met latere versies nog beter in de markt kunnen onderscheiden door bijvoorbeeld de huidige sluiting te vervangen door een karakteristieke (en herbruikbare) sluiting. Ook kan er gekeken worden naar een meer modulair ontwerp waardoor bepaalde onderdelen makkelijker kunnen worden vervangen of gerepareerd.

De bh is bedoeld om te dragen tijdens zwangerschap, kraamtijd én daarna. De inschatting is dat de bh 1-1,5 jaar gebruikt zal worden. Wij zien dat sommige vrouwen zwangerschapskleding na gebruik delen binnen kennissenkring maar ook dat gebruikte bh's vaak in een doos, kast, kledingbak of bij het restafval kunnen belanden. Een bh is nou eenmaal lastiger te delen vanwege specifieke maatvoering maar zeker ook vanuit hygiënisch oogpunt. Waar liggen de kansen voor de levensduur van de bh, in ontwerp én (deel)gebruik, met als doel deze zo lang mogelijk te rekken.

Feelou wil zo veel mogelijk voorkomen dat er waardevolle grondstoffen verloren gaan en pakt graag de regie van de bh in de keten in handen. Om echt ketens te kunnen gaan sluiten willen we de bh's terugnemen. Hoe richten we de keten zo in dat klanten hun bh daadwerkelijk terugsturen, wij de bh's efficiënt kunnen controleren, reinigen en een tweede leven geven óf ontmantelen.

Verwachting
- Circulair herontwerp product, gericht op verlengen levensduur/hergebruik en ontmanteling.
- Systeemontwerp, hoe zorgen we ervoor dat de levensduur van de bh gemaximaliseerd wordt en we kunnen toewerken naar het zoveel mogelijk sluiten van de keten.

A Circular Maternity Bra

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 date 21 - 02 - 2022

08 - 06 - 2022 end 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, ...).

The clothing industry is a major strain on the planet, both in carbon emissions and water usage. For example, this industry alone is responsible for 10% of human carbon emissions1. Therefore, we need to improve resource efficiency within this sector. Feelou, the client, found an area that has a lot of room for improvement: maternity bras. Each year, 165.000 women get pregnant in the Netherlands. These women buy multiple bras during their pregnancy, as their sizes continually change. They constantly need to look for better fitting bras, as most bras are made for just one size and one purpose. Feelou aims to develop a bra that can change according to the needs of the female body. They also aim to reuse and recycle their products after they become obsolete for the first user. In this way, their bras take into account both the human side and the planetary boundaries.

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TO PLACE YOUR IMAGE IN THIS AREA:
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image / figure 2:

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.

In 2022, Feelou will launch a first version of their product on the market. This version is tested on comfort and functionality. This design uses existing haberdashery and fabrics. In the circular redesign, it might be possible to include characteristic connections. Modularity could improve repairability and replaceability of certain parts.
The bra is designed to be used during pregnancy, the postnatal period and afterwards. The estimated lifespan is 1-1,5 years. After use, some women share their bras with other women, but often they end up in a closet, clothing container or in trash. There are multiple reasons that make bras a difficult product to give a second life: not only are there many sizes, but perceived hygiene also plays a role.

Finally, Feelou aims to reduce the loss of valuable resources. This is why the whole chain should be considered for the redesign. To actually close the loop, a system needs to be in place that recollects the bras when they are no longer used. The chain needs to be built in such a way that customers actually return the products after use. There also needs to be quality control and the bras need to be cleaned before they get a second life, or they will be dismantled to recycle them efficiently.

ASSIGNMENT **

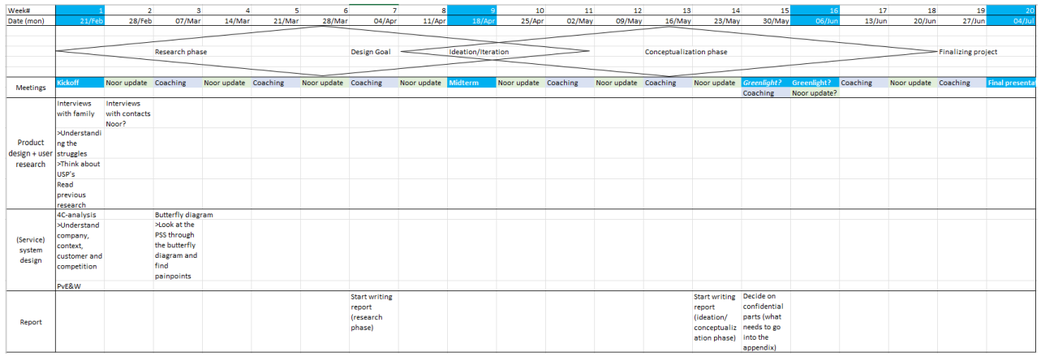
State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service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

In this project for a (re)design of the circular product service system, I will research customer preferences surrounding the circular redesign of the Feelou bra. The final product redesign will fit the customer preferences and take the planetary boundaries into account by increasing its lifespan, reusability and recyclability. The system design will make sure the product lifespan will be optimised and it will work towards closing the loop.

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 21 - 2 - 2022 8 - 6 - 2022 end date



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.

For my graduation project, I set out to find a client that would give me the ability to design for the circular economy. I wanted to use my SPD-knowledge about user research, systemic design and design for sustainability. I have done many designs for circular economy, and I wanted to incorporate my SPD-knowledge into that. I also loved the startup approach which I learned from Social Venturing, and that made Feelou a perfect candidate.

However, when Feelou came to me, I hesitated. On one hand, the brief was exactly the type of product I was looking for and my design might have an actual impact, but on the other hand, the product, bras, were something I was somewhat unfamiliar with. Of course I had had girlfriends and I heard about the struggles, but obviously, I don't wear them myself. And on top of that, multiple people had told me that many women don't even know enough about bra sizes themselves.

When I thought about this, this actually made the product even more interesting to me. Designers often get the challenge to design for a product category they are unfamiliar with. However in this case, women themselves aren't even familiar enough with the way sizes for bras are set up, and this product would address that too.

If I could have a positive impact with my redesign, that would be an amazing accomplishment and I would be super proud. However even if it doesn't work out, I expect to learn a lot from it. Not only from the clothing industry and designing clothing, but also from designing for circular economy and the startup approach.

FINAL COMMENTS

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

1 = https://www.weforum.org/agenda/2020/01/fashion-industry-carbon-unsustainable-environment-pollution/

Appendix B: Problem exploration mindmaps

Appendix C: Interviews

Interview Nathalie (22-02-2022)

Maten
Wat gebeurde er met jou met die maten rondom je zwangerschap?
Je borstomvang groeit. Je koopt nieuwe bh's tijdens de laatste fase van je zwangerschap. Pas de 5e dag na de bevalling komt de melkproductie echt op gang.

Nieuwe bh's kopen
Hoe ziet het proces van nieuwe bh's kopen er bij jou uit?
Geen beugels: de metalen staaf die erin zit broeit of zorgt voor een allergische reactie. Door beugels krijg je tunneltjes (het drukt in je huid).

Heb je voor je zwangerschap(pen) veel nieuwe bh's voor moeten kopen?
Meteen voor voedingsbh's gegaan. Onzin om nieuwe bh's te kopen waarvan je weet dat ze 3 mnd na de bevalling niet meer passen. Koop een bh van 50 eu die je misschien maar 2 maanden aan hebt. Draag altijd sportbh's omdat ze flexibel zijn en comfortabel zitten. Voedingsbh's zijn redelijk elastisch waardoor ze meegroeien en comfortabeler zijn. Na 5 dagen borstvoeding gestopt omdat ik me net een melkkoe voelde.

Bij Amena had ik 1 zwarte voedingsbh en die ben ik blijven gebruiken na de zwangerschap. Bij ieder kind nieuwe bh's gekocht, omdat er veel tijd tussen zat (7 jaar).

Was er op dit gebied verschil tussen je eerste, tweede en derde zwangerschap?
Borsten werden kleiner omdat ik ook zelf afviel. Begon op 85B en nu op 75-80B.

Hoeveel bh's zou je minimaal nodig hebben als je niet op maten zou hoeven letten?
Ligt eraan of je alleenstaand bent of niet, dan was je minder vaak. Ik was elke dag, dus ik heb er niet zoveel nodig. 4 voedingsbh's. Omdat die flexibeler zijn heb je minder last van verschillende maten. Heb ook een voedingsbh die je aantrekt als een topje, geen haakjes, die schuif je aan de kant. Soms heb je ze ook waar je een lapje naar beneden doet, maar dan zit er nog een lijntje over de borst heen. Dat kan de melktoevoer afknellen of in de weg zitten.

Borstvoeding
Kun je me vertellen hoe de keuze voor wel of geen borstvoeding er bij jou uitzag?
Je merkt dat je borst voller wordt, dus dat je voeding aanmaakt. Je productie wordt aangemaakt door de hormonen in je lichaam. Die zorgt dat alles op gang komt. Dag 5 komt die productie meestal volledig op gang. Bij Jax kwam er onvoldoende melk uit. Uiteindelijk heb ik moeten kolven en toen moest ik 6-7 flessen van 60cc per dag hebben, maar er kwam maar 60cc per dag op gang. Bij Amena ook borstvoeding gegeven. Owen zoog niet hard genoeg dus de melkproductie kwam niet op gang. Owen was +8% afgevallen, dat is een teken dat hij te weinig voeding kreeg uit de borst en dat hij bijgevoed moest worden.

Omdat het bij Jax niet op gang kwam, moest ik Jax 20 min per borst aanleggen, daarna nog kolven. Dat keer 7 ben je dus ongeveer de hele dag bezig. Daarom voelde ik me een melkkoe.

Bh's en zwangerschap algemeen
Zijn er dingen die je over bh's geleerd hebt tijdens je zwangerschap? En hoe zag dat leerproces eruit?
Wist wel van tevoren dat de maten tijdens de zwangerschap veranderen. Bij de eerste wil je alles nieuw, bij de tweede ben je er iets makkelijker in. De derde zal het allemaal wel. Dus steeds minder geld uit gaan geven. Bij de eerste zwangerschap heel erg de richtlijnen gevolgd. Kraamverzorgster waste elke dag 3 wasjes, dus als ze sliep was sochtends de was alweer gedaan en kon ze de bhs alweer opnieuw gebruiken.

Wat zijn dingen over bh's waarvan je denkt dat mannen het niet weten?
De meeste mannen laten het aan de vrouw over. Je kunt het ook online bestellen. Ik deed alles zelf, dus Bob wist er niet zoveel van. Alles de eerste week werd door de man gekocht, want ik mocht de deur niet uit.

Op een gegeven moment krijgen vrouwen stuwingen, dan gaat de borst lekken. Dan moeten er padjes tussen, maar die verschoven bij mij altijd. Wasbare padjes zou ook beter zijn, nu gooi je ze weg. Je koopt ze omdat ze op het lijstje staan, maar eigenlijk is het zonde want ik heb nu twee doosjes (3 eu/stuk, maar wel nog steeds zonde van het geld) over.

Hoe denk je dat ik dit soort onderwerpen het best bespreekbaar kan maken?
Duidelijke vragen stellen: zorg dat ze de vraag begrijpen. Vraag ze wat ze zouden willen verbeteren.

Tweedehands
Als een bh eerder door een andere vrouw gedragen is, maar volledig gereinigd wordt, zou je hem dan dragen?
Ik heb daar op marktplaats wel eens naar gekeken. Bij de eerste alles nieuw, maar de tweede al naar gekeken. De derde zal het allemaal wel. Zoek maar eens op wat je voor een "mooie" zwangerschapsbh zou moeten betalen.

Maakt het daarbij uit of je die vrouw (goed) kent?
Als ik haar ken zou ik er echt geen problemen mee hebben. Van mijn vriendinnen heb ik een zwangerschapsjas gekregen en ondergoed (20eu/stuk). Dat was duur om zelf te moeten kopen, en na de zwangerschap gebruik je het niet meer. Dus zonde om zelf te kopen.

Eerste kind ben je gemiddeld in het eerste jaar 5.000 euro kwijt. Sommige mensen hebben dat geld niet en moeten op zoek naar een andere oplossing. Mensen die dat geld hebben, kiezen voor de makkelijke weg. Ik heb wel de kinderwagen en veel kleding tweedehands gekocht. Omdat ik uit ervaring weet dat ik heel veel weg moest gooien dat nooit gedragen was, dat is zonde.

Vanaf 13-14 jaar zou ik wel nieuwe kleding gaan kopen. Voor Jax slijt de kleding niet omdat hij alleen ligt. Een tweedehands bh kan de rek verliezen. Als het getest is en zo goed als nieuw, zou ik het wel overwegen als het minder geld kost.

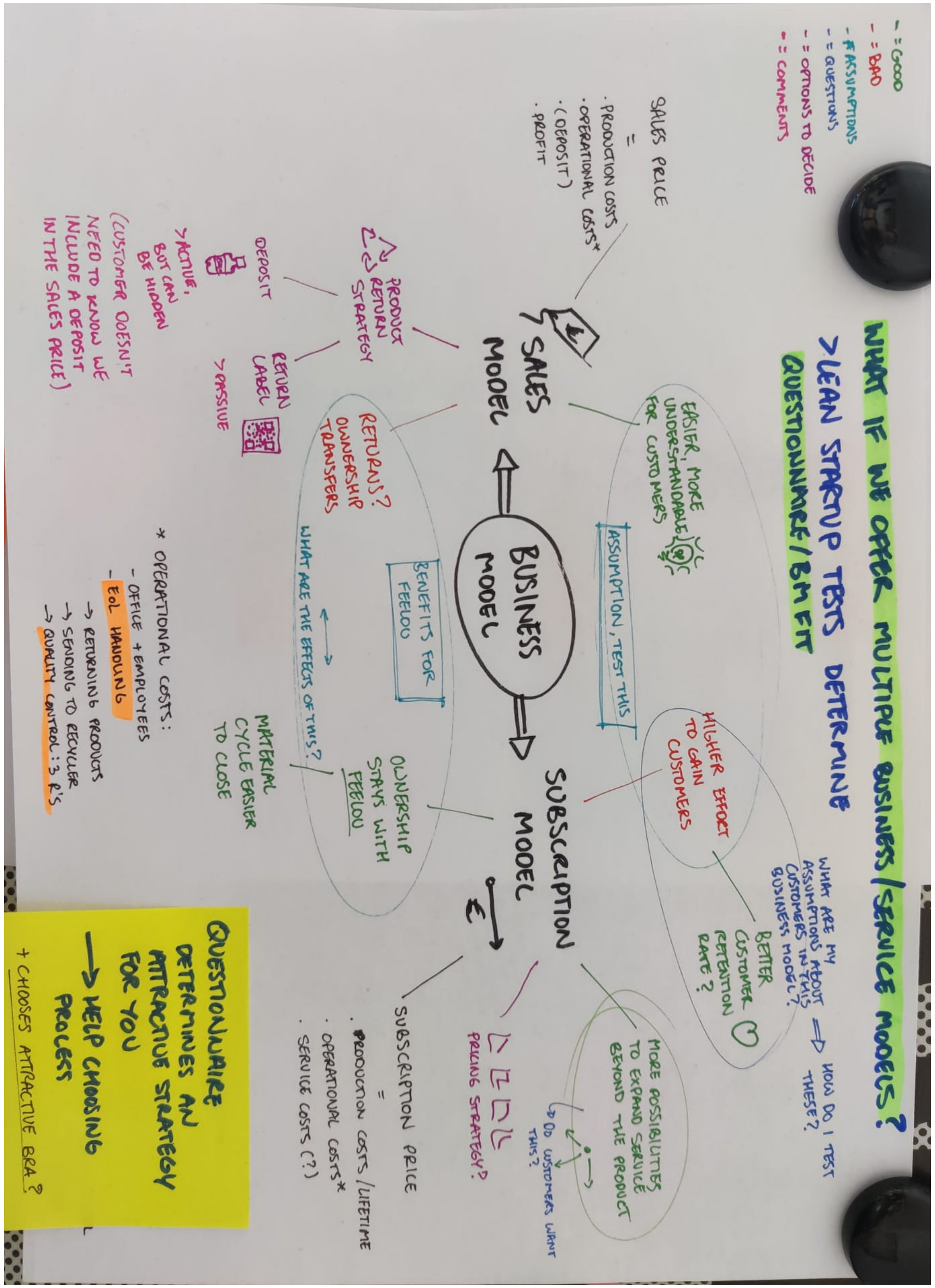
Zalando vroeg om shirts terug te sturen om ze een tweede leven te geven. Iets waar je 30 eu voor hebt betaald, krijg je dan 5 eu voor terug. Iemand anders betaalt er dan 15 eu voor.

Er ís wel een tweedehands markt voor babyspullen, maar vooral op marktplaats e.d.

Er zou een bedrijf tussen moeten staan dat materiaal opkoopt en dan "least" aan ouders van pasgeboren kinderen.

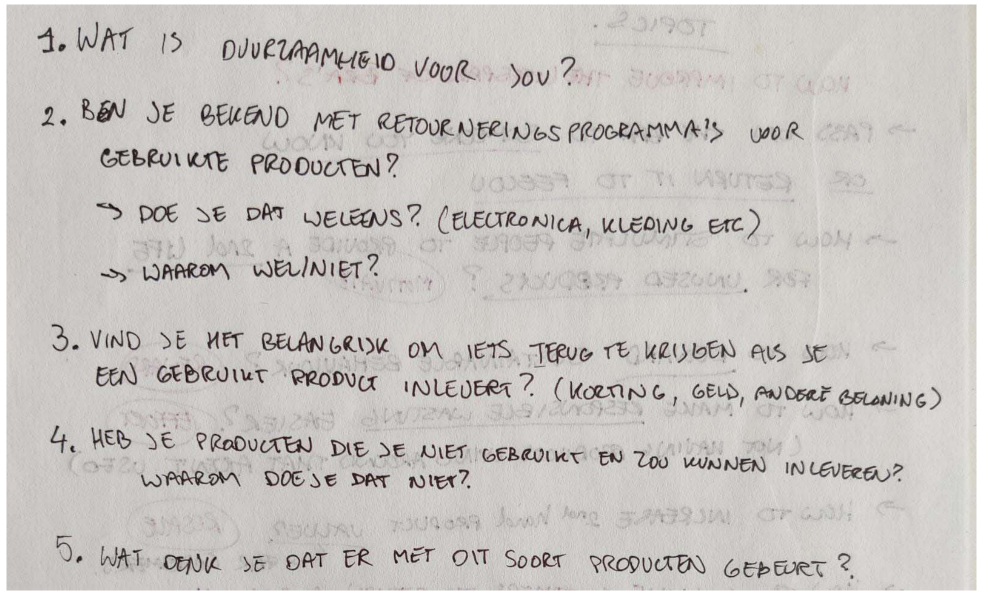
Insights from a spontaineous conversation with family:

Appendix D: Business model mindmap



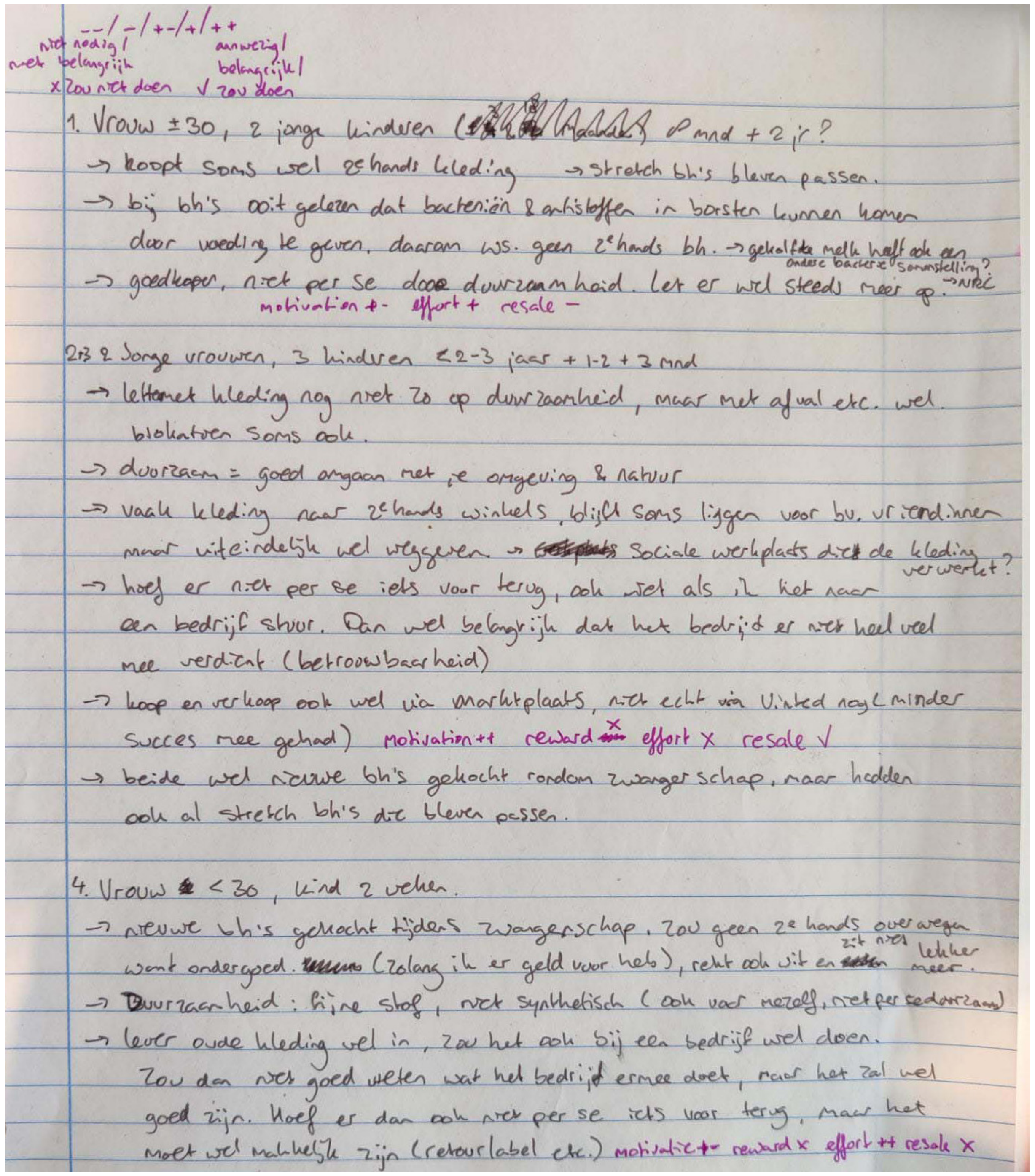
Appendix E: Brainstorm results

1. Interview guide for playground interviews.



1. WAT IS DUURZAAMHEID VOOR JOU?
2. BEN JE BEKEND MET RETOURNERINGSPROGRAMMA'S VOOR GEBRUIKTE PRODUCTEN?
   → DOE JE DAT WELEENS? (ELECTRONICA, KLEDING ETC)
   → WAAROM WEL/NIET?
3. VIND JE HET BELANGRIJK OM IETS TERUG TE KRIJGEN ALS JE EEN GEBRUIKT PRODUCT INLEVERT? (KORTING, GELD, ANDERE BELONING)
4. HEB JE PRODUCTEN DIE JE NIET GEBRUIKT EN ZOU KUNNEN INLEVEREN? WAAROM DOE JE DAT NIET?
5. WAT DENK JE DAT ER MET DIT SOORT PRODUCTEN GEBEURT?

2. Interviews on the playground.



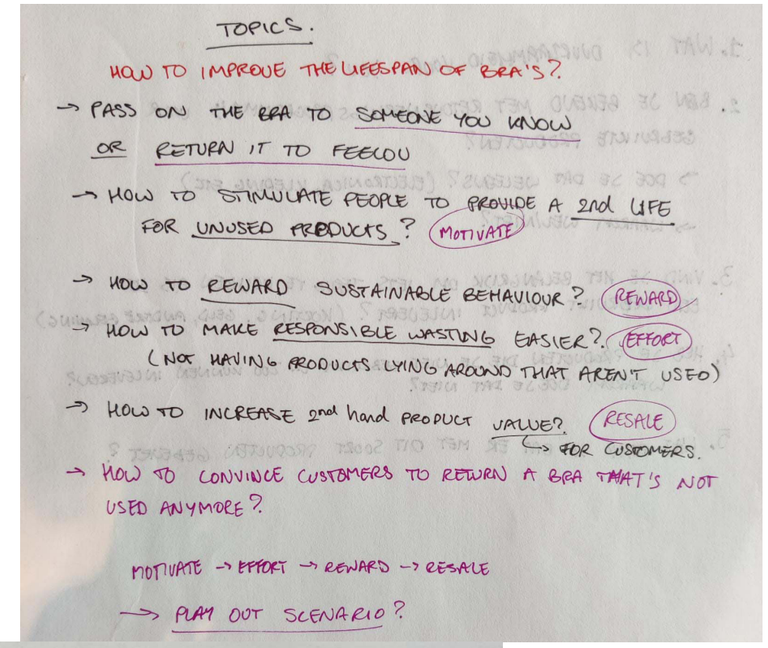
-- / - / +- / + / ++
niet nodig / niet belangrijk / x zou niet doen
aanwezig / belangrijk / ✓ zou doen

1. Vrouw ±30, 2 jonge kinderen (...) 8 mnd + 2 jr?
→ koopt soms wel 2e hands kleding → stretch bh's bleven passen.
→ bij bh's ooit gelezen dat bacteriën & antistoffen in borsten kunnen komen door voeding te geven, daarom ws. geen 2e hands bh. → geldt dit ook voor andere bacteriën? (stelling?)
→ goedkoper, niet per se door duurzaamheid. Let er wel steeds meer op. → niet
motivation +- effort + resale -

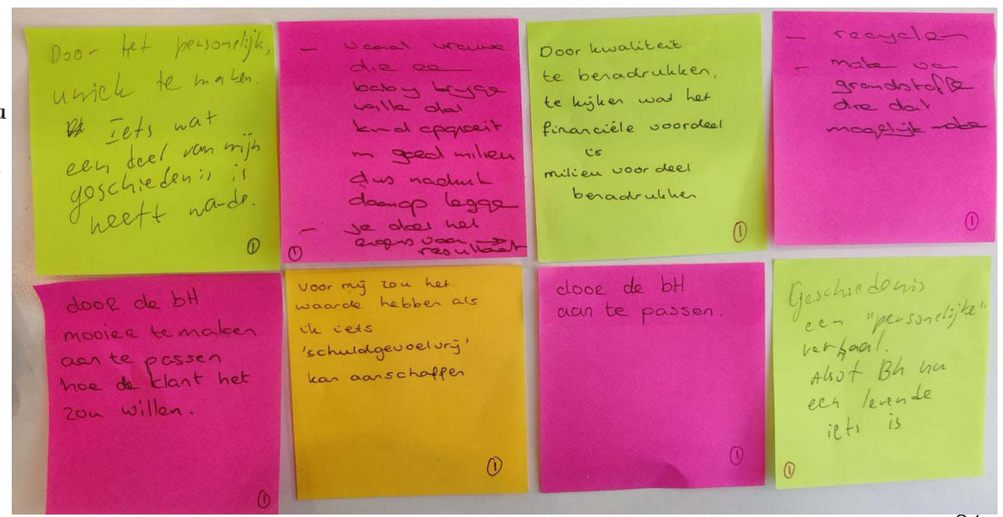
2&3 2 jonge vrouwen, 3 kinderen ≤2-3 jaar + 1-2 + 3 mnd
→ letten met kleding nog niet zo op duurzaamheid, maar met afval etc. wel. biologische soms ook.
→ duurzaam = goed omgaan met je omgeving & natuur
→ vaak kleding naar 2e hands winkels, blijft soms liggen voor bv. vriendinnen maar uiteindelijk wel weggeven → Sociale werkplaats die de kleding verwerkt?
→ hoef er niet per se iets voor terug, ook niet als ik het naar een bedrijf stuur. Dan wel belangrijk dat het bedrijf er niet heel veel mee verdient (betrouwbaarheid)
→ koop en verkoop ook wel via marktplaats, niet echt via Vinted nog (minder succes mee gehad) motivation ++ reward x effort x resale ✓
→ beide wel nieuwe bh's gekocht rondom zwangerschap, maar hadden ook al stretch bh's die bleven passen.

4. Vrouw < 30, kind 2 weken
→ nieuwe bh's gekocht tijdens zwangerschap. Zou geen 2e hands overwegen want ondergoed. (zolang ik er geld voor heb), zit niet lekker meer, rekt ook uit en ...
→ Duurzaamheid: fijne stof, niet synthetisch (ook voor mezelf, niet per se duurzaam)
→ lever oude kleding wel in, zou het ook bij een bedrijf wel doen. Zou dan niet goed weten wat het bedrijf ermee doet, maar het zal wel goed zijn. Hoef er dan ook niet per se iets voor terug, maar het moet wel makkelijk zijn (retourlabel etc.) motivatie +- reward x effort ++ resale x

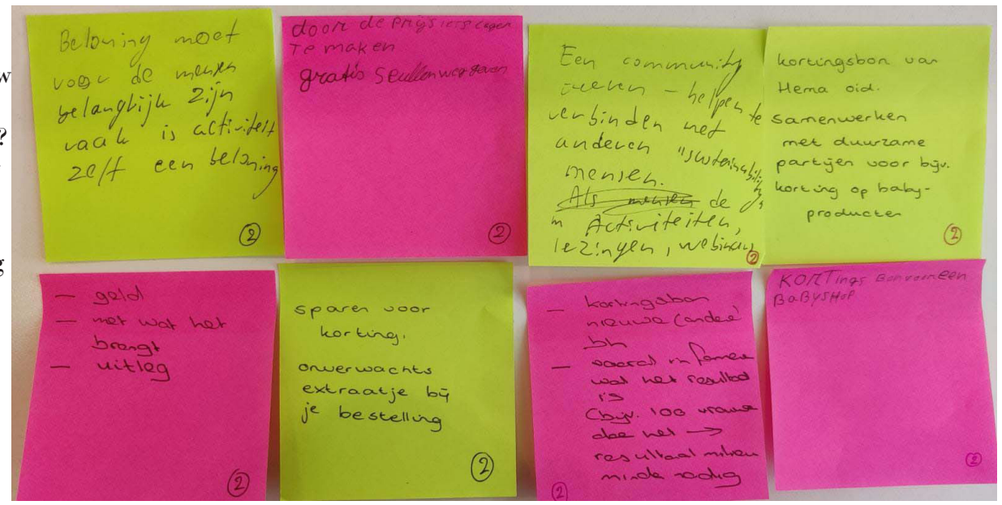
3. HKJ formulation.



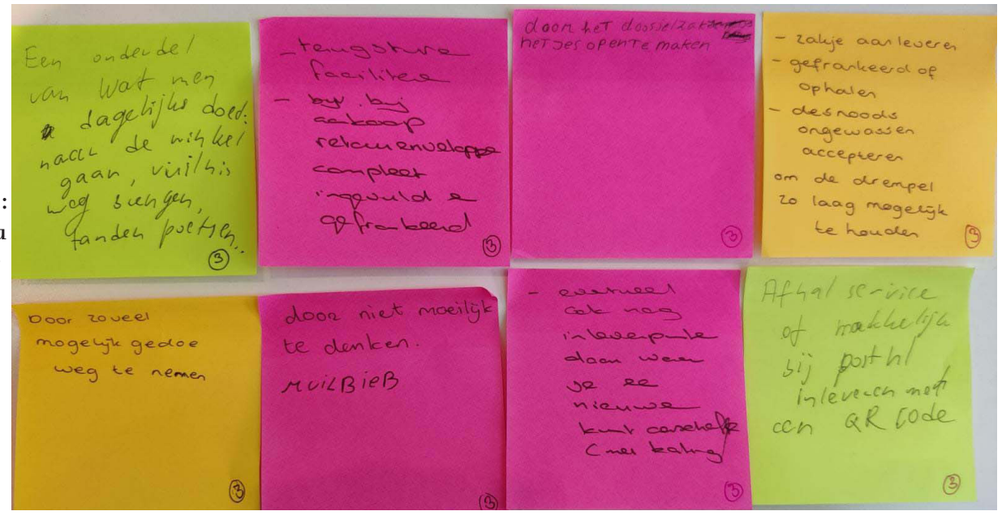
4a. Results HKJ 1. Black 1: How can you add value? Pink 1: How can you add value to a second hand bra?



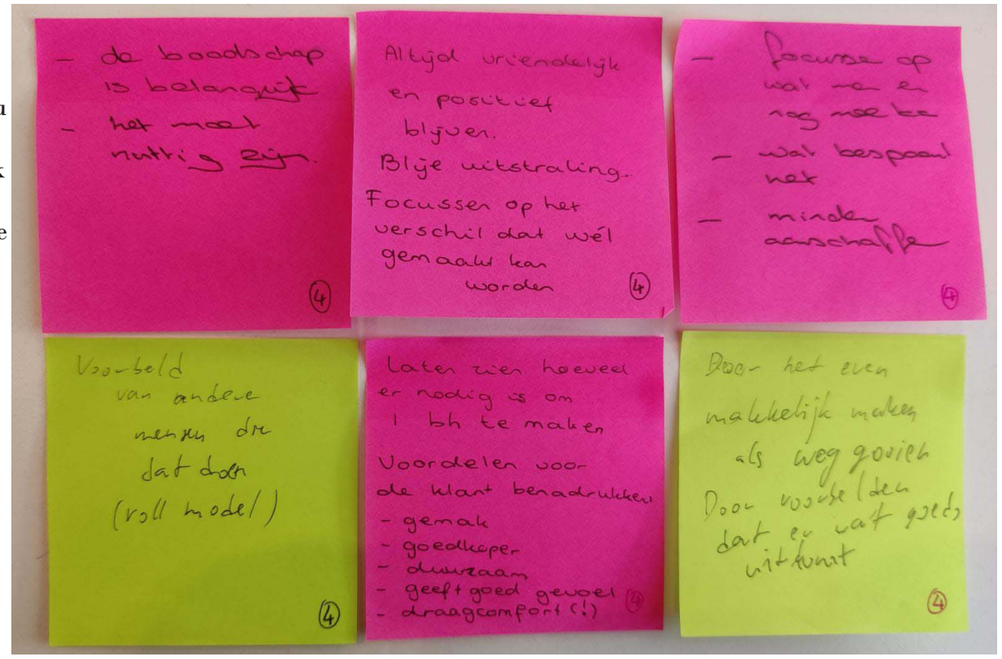
4b. Results HKJ 2. Black 2: How can you reward people? Pink 2: How can you reward people for returning a used bra?



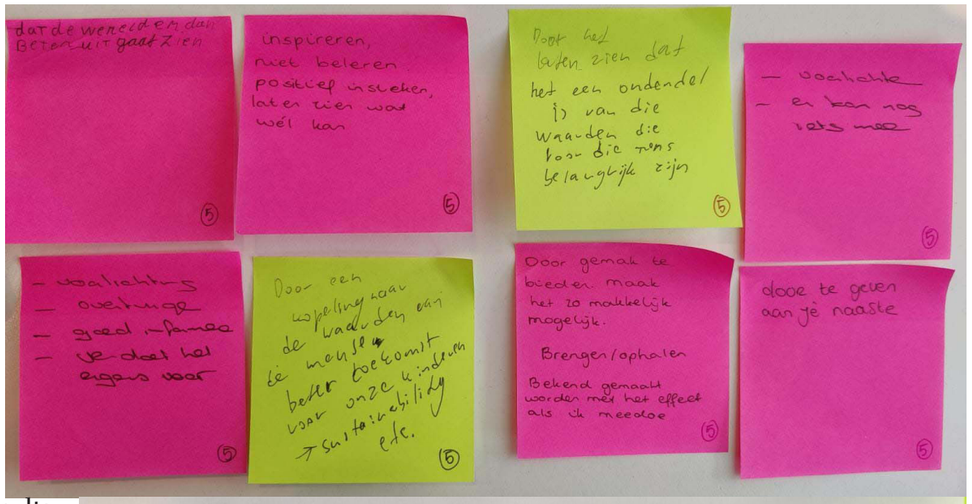
4c. Results HKJ 3. Black 3: How can you make something easy? Pink 3: How can you make it easy to return bras?



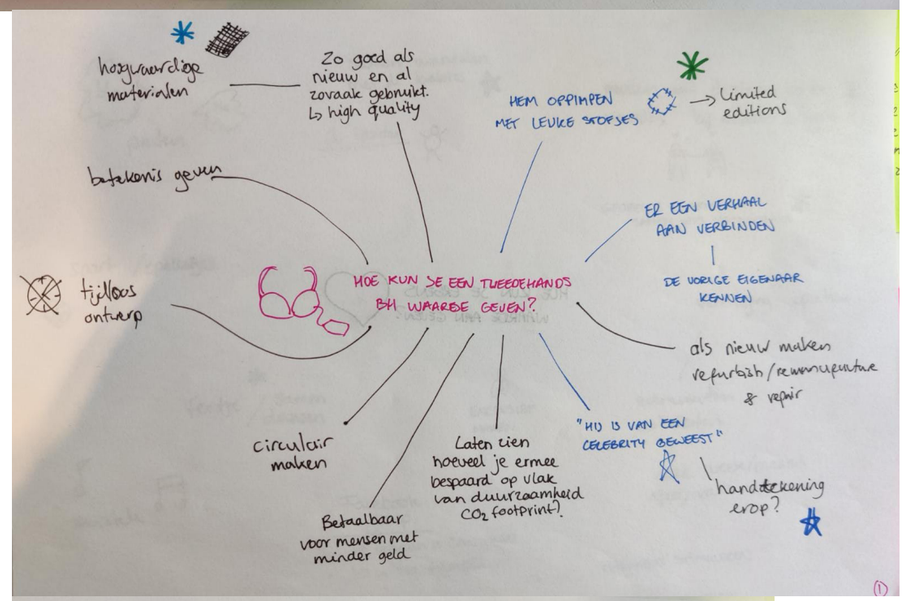
4d. Results HKJ 4. Black 4: How can you motivate people? Pink 4: How can you motivate people to give a bra a second life?



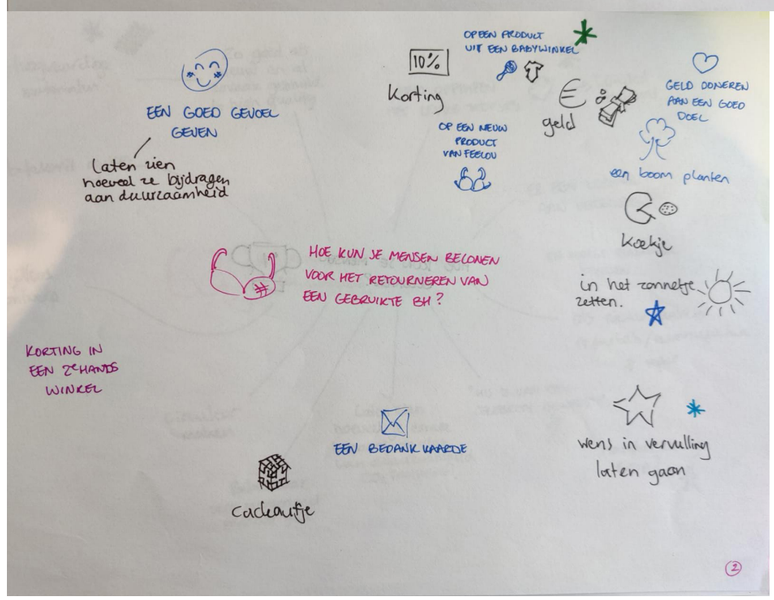
4e. Results HKJ 5.
Black 5: How can you stimulate people?
Pink 5: How can you stimulate people to return an unused bra?



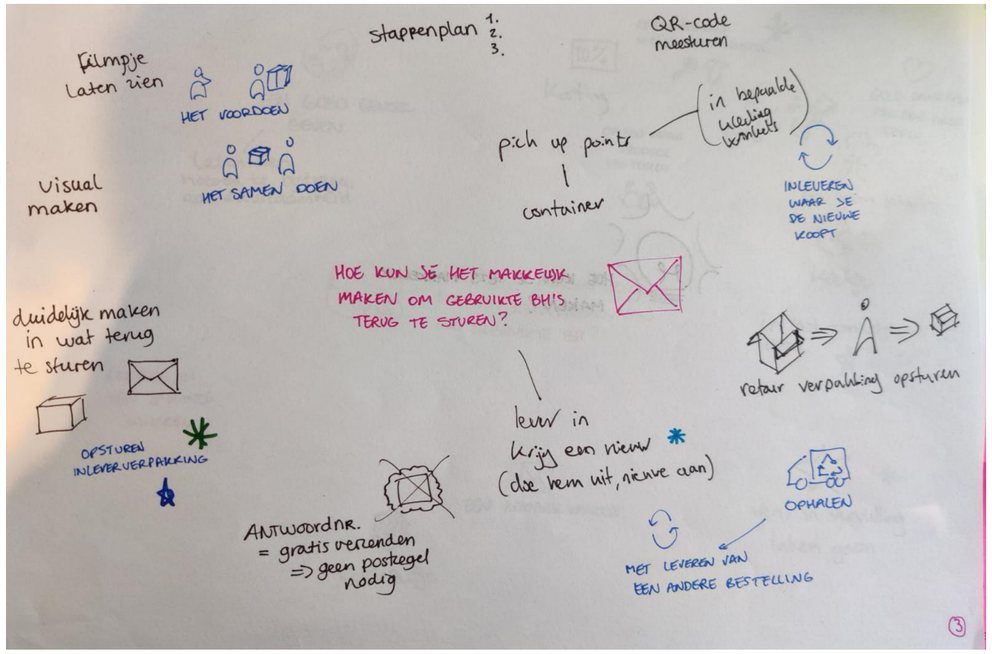
5a: Results HKJ 1 with students.



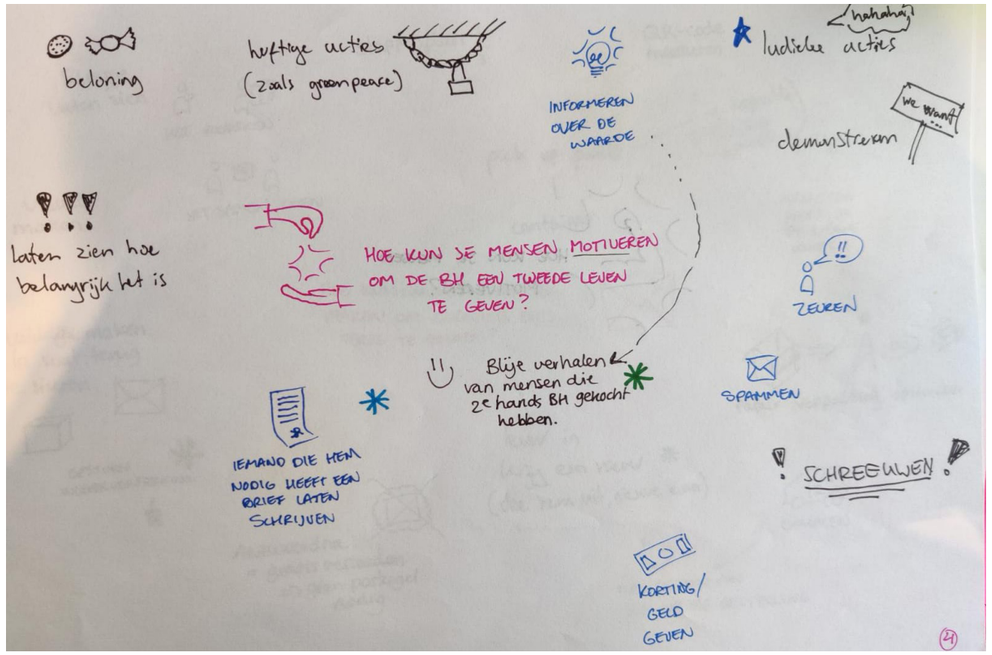
5b. Results HKJ 2 with students.



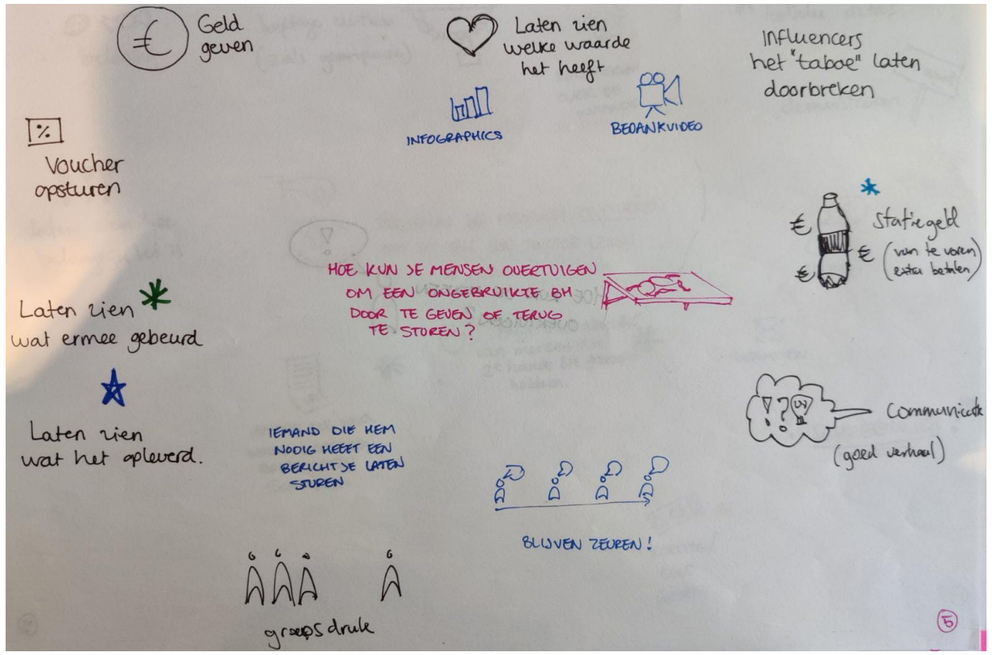
5c. Results HKJ 3 with students.



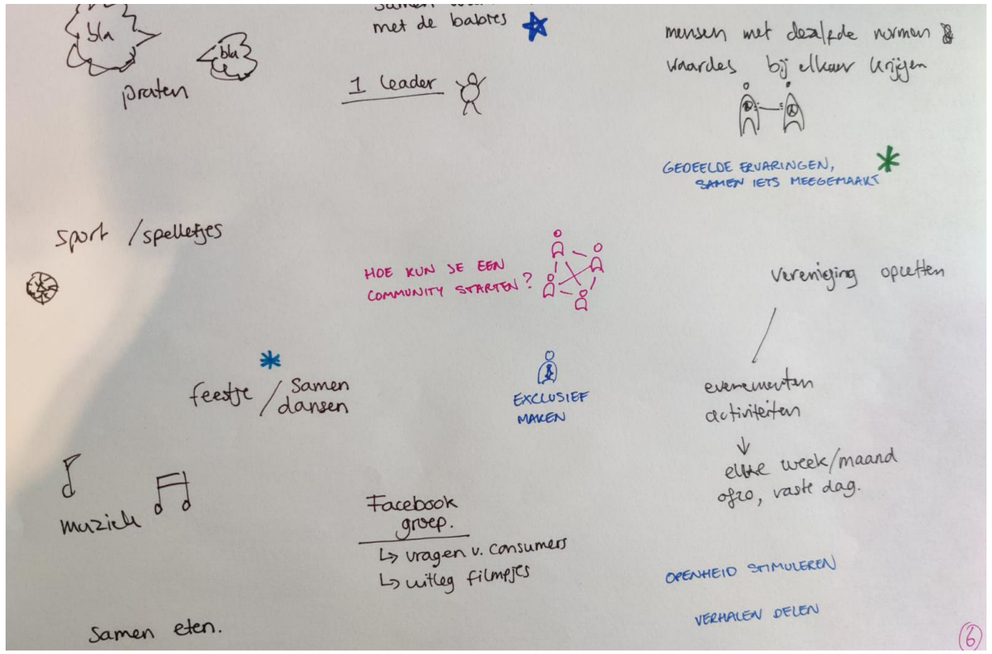
5d. Results HKJ 4 with students.



5e. Results HKJ 5 with students.



5f. Results HKJ 6 with students.



6a. Digital results overview HKJ 1.

6b. Digital results overview HKJ 2.

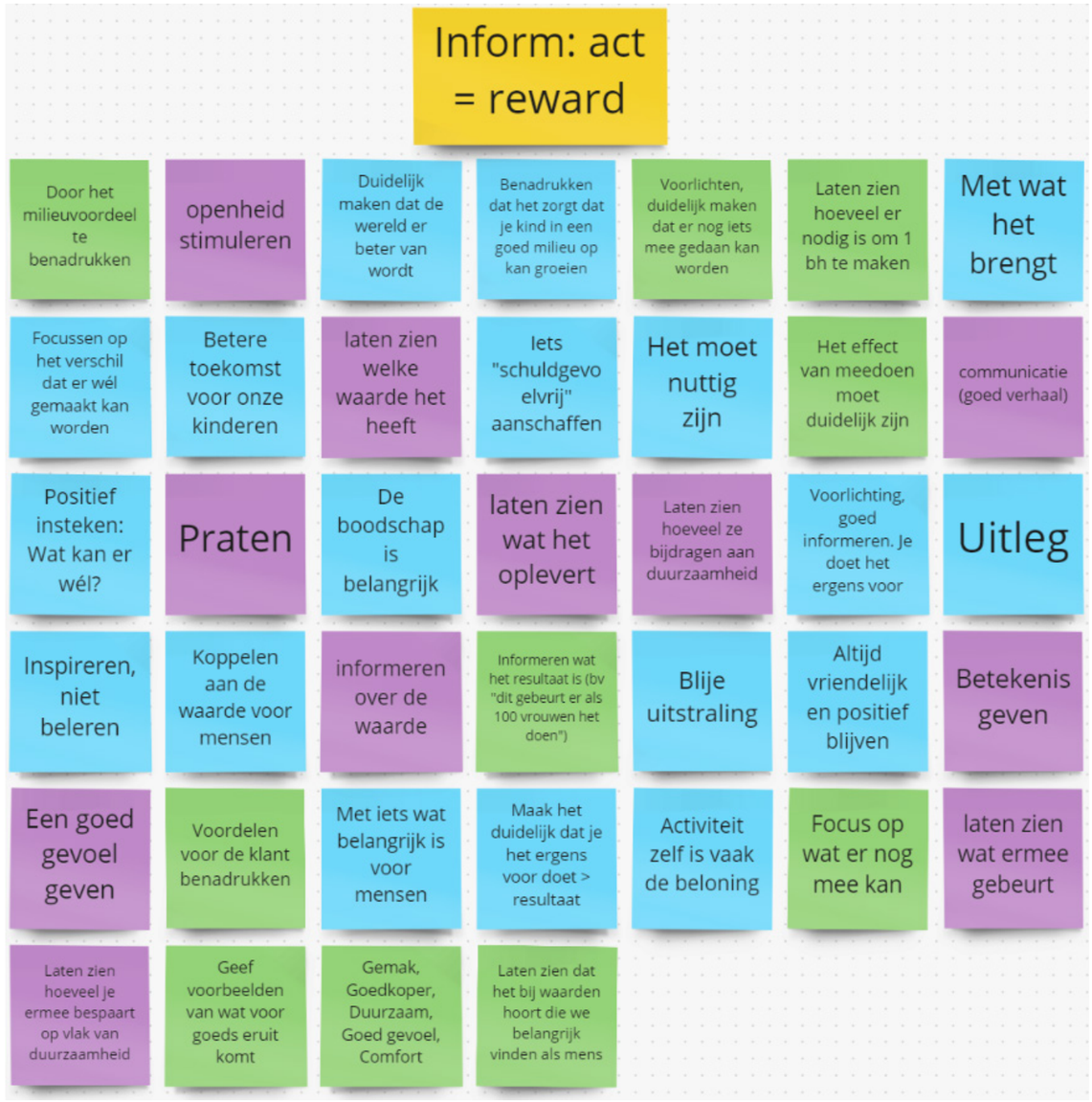
6c. Digital results overview HKJ 3.

6d. Digital results overview HKJ 4.

6e. Digital results overview HKJ 5.

6f. Digital results overview HKJ 6.

7. These brainstorm results were then clustered and named.



Consumption rewards

- Geld
- Sparen voor korting
- geld geven
- Kortingsbon voor een babyshop
- Door gratis spullen weg te geven
- Een bedankkaartje
- Korting op een duurzaam/circulair bedrijf voor babyspullen ("Hier kun je verder met duurzame consumptie")
- lever in en krijg een nieuwe (doe hem uit, doe hem aan)
- Korting
- Beloning
- Voucher opsturen
- Door het financiele voordeel te laten zien
- Wat bespaart het? Mensen hoeven minder aan te schaffen
- Onverwachts extraatje bij je bestelling
- Koekje
- Korting op een nieuw product van Feelou
- Door de prijs te verlagen
- Korting in een tweedehands winkel
- Samenwerken met duurzame partijen (bijv korting op babyproducten)
- Geld
- Kortingsbon voor een nieuwe (andere) bh
- Wens in vervulling laten gaan
- Kortingsbon (HEMA oid)
- Korting op een product uit een babywinkel
- korting/geld geven
- statiegeld (van tevoren extra betalen)
- Cadeautje

Make it easy

- het voor doen
- Door niet te moeilijk te denken
- Antwoordnummer = gratis verzenden (geen postzegel nodig)
- Afhaalservice
- retourverpakking opsturen
- Door het mensen zo makkelijk mogelijk te maken
- Inleverpunten waar je nieuwe aan kunt schaffen (evt met korting)
- Bij aankoop retourenveloppen ingevuld en gefrankeerd
- opsturen inleververpakking
- QR-code meesturen
- Maak het even makkelijk als weggooien
- stappenplan
- container
- Zakje aanleveren, gefrankeerd
- pick up points
- Duidelijk maken in wat terug te sturen
- Bij PostNL inleveren met QR code
- Terugsturen faciliteren
- Door zoveel mogelijk gedoe weg te nemen
- Ophalen
- met leveren van een andere bestelling meegeven
- Brengen/ophalen
- Ongewassen producten accepteren
- inleveren waar je de nieuwe koopt
- ophalen
- Door het doosje netjes open te maken en te hergebruiken om het terug te sturen
- Maak het een onderdeel van wat men dagelijks doet (naar de winkel gaan, vuilnis buiten zetten, tanden poetsen)

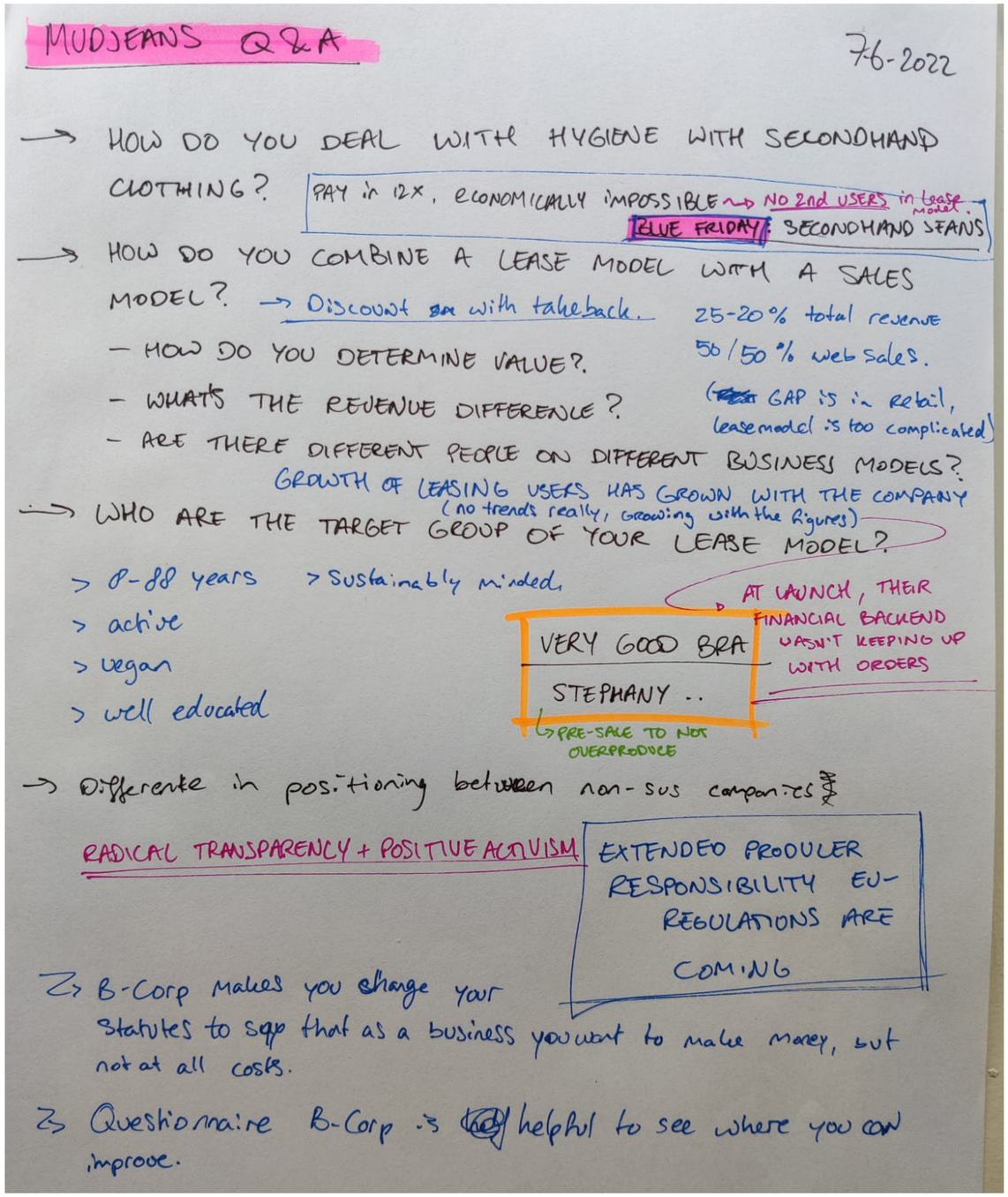
Increase (emotional) value

- Geschiedenis, een "persoonlijk" verhaal. Alsof de bh iets levends is
- Zo goed als nieuw en al zovaak gebruikt (high quality)
- Hoogwaardige materialen
- Handtekening erop
- Door de bh aan te passen
- Door de bh mooier te maken
- De vorige eigenaar kennen
- In het zonnetje zetten
- Limited editions
- Er een verhaal aan verbinden
- Hem oppimpen met leuke stofjes
- Als nieuw maken (refurbish/remanufacture & repair)
- Door de bh aan te passen zoals de klant het wilt
- verhalen delen
- Iets wat een deel van mijn geschiedenis is, heeft waarde
- Door het persoonlijk/ uniek te maken
- exclusief maken
- Door de kwaliteit te benadrukken
- Tijdloos ontwerp

Community feeling

- samen eten
- het samen doen
- sport/spelletjes
- gedeelde ervaringen, samen iets meegemaakt
- Community met activiteiten, lezingen en webinars
- feestje, samen dansen
- evenementen
- Een community creeëren, helpen te verbinden met andere duurzame mensen
- elke week/maand, vaste dag
- infographics
- activiteiten
- mensen met dezelfde normen en waardes bij elkaar krijgen
- facebook groep met vragen van consumers en uitlegfilmpjes
- vereniging opzetten
- Samen wandelen met de babies


Lead by example
1 leader
influencers "het taboe" laten doorbreken
Rolmodel: Voorbeelden van andere mensen die het doen
Hij is van een celebrity geweest"
2nd user emphasis
blije verhalen van mensen die 2ehands bh gekocht hebben
Iemand die hem nodig heeft een brief laten schrijven
Door je naasten er blij mee te maken
Betaalbaar voor mensen met minder geld
Iemand die hem nodig heeft een berichtje laten sturen
Media
Ruilbieb
bedankvideo
muziek
Visual maken
Filmpje laten zien
Attention by action
heftige acties (bv als Greenpeace)
ludieke acties
Altruistic rewards
Geld doneren aan een goed doel
Bomen planten
Sustainability
Recyclen
Circulair maken
Maken van grondstoffen die recycling mogelijk maken
Negative attention
groepsdruk
blijven zeuren
zeuren
spammen
schreeuwen
demonstreren


MUDJEANS Q&A
7-6-2022
→ HOW DO YOU DEAL WITH HYGIENE WITH SECONDHAND CLOTHING?
PAY in 12x, ECONOMICALLY IMPOSSIBLE ~> NO 2nd USERS in lease model.
BLUE FRIDAY: SECONDHAND JEANS
→ HOW DO YOU COMBINE A LEASE MODEL WITH A SALES MODEL? → Discount on with takeback.
25-20% total revenue
50/50% web sales.
- HOW DO YOU DETERMINE VALUE?
- WHAT'S THE REVENUE DIFFERENCE?
(GAP is in Retail, lease model is too complicated)
- ARE THERE DIFFERENT PEOPLE ON DIFFERENT BUSINESS MODELS?
GROWTH OF LEASING USERS HAS GROWN WITH THE COMPANY
(no trends really, growing with the figures)
→ WHO ARE THE TARGET GROUP OF YOUR LEASE MODEL?
> 0-88 years
> Sustainably minded
> active
> vegan
> well educated
AT LAUNCH, THEIR FINANCIAL BACKEND WASN'T KEEPING UP WITH ORDERS
VERY GOOD BRA
STEPHANY ..
↳PRE-SALE TO NOT OVERPRODUCE
→ Differente in positioning between non-sus companies
RADICAL TRANSPARENCY + POSITIVE ACTIVISM
EXTENDED PRODUCER RESPONSIBILITY EU-REGULATIONS ARE COMING
=> B-Corp makes you change your statutes to say that as a business you want to make money, but not at all costs.
=> Questionaire B-Corp is helpful to see where you can improve.

Appendix G: Emails with clothing recycler

Email contact with Frankenhuis B.V., a textile recycler.

Goeiemorgen Odmar,

Dank voor je mail en je interesse in Frankenhuis! Ik hou me binnen de organisatie onder andere bezig met studenten vraagstukken. Ik ben het met je eens! Naar mijn idee komt dat met name doordat er geen eenduidige definitie bestaat voor alle termen die met recycling te maken hebben. Er wordt dus op basis van eigen interpretatie een verhaal gecreëerd die (in sommige gevallen) mijlenver van de werkelijkheid ligt! Helaas hebben ik het momenteel erg druk en op korte termijn geen tijd om een call met je in te plannen. Ik kan wel proberen onderstaande vragen zo goed mogelijk voor je te beantwoorden;

- Doen jullie aan sortering van de ingekomen kledingstukken/textiel?
  In principe is dat vooraf al gedaan, tenzij we materialen binnen krijgen vanuit de dienst; inname of vertrouwelijke recycling
- Is dat op basis van soort kleding of ook op basis van materiaal/kleur/etc?
  Wij kopen uit gesorteerde kleding in van grote sorteerbedrijven of kringloop organisaties. Zij sorteren het op verschillende soorten “smaken”, denk hierbij bijvoorbeeld aan; blauwe jeans bij blauwe jeans, synthetisch gebreide truien bij synthetisch gebreide truien. Voor ons is dit grondstof voor onze processen.
- Om wat voor batchgroottes gaat dat?
  De kleding wordt in balen geperst van om en nabij een meter bij een meter, afhankelijk van het type materiaal (katoen is bijvoorbeeld zwaarder dan synthetisch) varieert het gewicht tussen de 300 en 500 kilo per stuk. Wij verwerken maandelijks ongeveer 800.000 kg met name post-consumer kleding, dat staat gelijk aan ongeveer 40 volle vrachtwagens.
- Hoe ziet het proces van ingeleverde textiel tot nieuwe stof eruit?
  Heel kort en simpel gezegd verwerken wij het textiel op een manier dat het geschikt is voor vervolg industrieën. Je kunt je voorstellen dat je niet een compleet kledingstuk zomaar in een machine kunt duwen, die moet eerst bewerkt worden zodat het in een specifiek vervolgproces kan worden ingezet. Wij maken dus niet echt een product, maar een halffabricaat. Voor alsnog bestaat het grootste gedeelte uit “vervezeling” zoals dat zo mooi heet. Daarbij trekken we als het ware het textiel uit elkaar tot een stapelvezel, vanuit hier gaat het door naar de vilt en/of non-woven industrie waar er panelen voor auto’s, wasmachines, vaatwassers etc van worden gemaakt. We zijn hard aan het werk om te kijken of deze vezels ook geschikt zouden kunnen zijn voor het opnieuw spinnen tot garen en uiteindelijk tot textiel, maar daar is nog ontwikkeling voor nodig. Daarnaast leveren we, door middel van een ander proces dan het vervezelen, ook materiaal aan voor het chemisch verwerken van wit katoen - hiervan wordt weer viscose en uiteindelijk kleding gemaakt!
- Hoe efficiënt is dat proces ongeveer? Gaat er veel materiaal verloren bij het recyclen?
  Er gaat zeker wel wat materiaal verloren, er zitten natuurlijk ook dingen op/aan het textiel die je er af wilt hebben! Denk hierbij bijvoorbeeld aan knopen, ritsen, gespen, maar ook stof. In ons vervezel proces vallen harde materialen automatisch uit de lijn, omdat we van lucht gebruik maken als transportmiddel. Deze materialen worden deze op een gegeven moment zwaarder dan het textiel zelf en worden op verschillende plekken opgevangen. Dit wordt weer opgekocht en dus ook opnieuw ingezet. Daarnaast hebben we een aantal filters die het stof opvangen. Alle katoen houdende (jeans) grondstoffen worden geperst en apart bewaard, waarnaar er (jeans)papier van wordt gemaakt.

Ik hoop dat ik je hiermee in ieder geval een beetje heb kunnen helpen.
Mocht je nog vragen hebben of er iets onduidelijk zijn, mail me dan gerust!

My answer to their first reply.

Super bedankt voor je uitgebreide antwoord! Dit maakt het een stuk makkelijker om me voor te stellen hoe het recyclingproces eruit ziet. Ik denk dat ik nog 1 onderdeel heb waar ik graag wat dieper op in zou gaan, en dat is de sortering vóór het vervezelen. Als ik het goed begrijp is het voor de non-woven industrie minder belangrijk om pure grondstofstromen te behouden dan voor bedrijven die er daadwerkelijk nieuwe stoffen van zouden maken, maar ik kan me voorstellen dat er nog steeds wel eisen zijn aan de sortering. Stellen jullie zelf de categorieën op waar post-consumer textiel in gesorteerd moet worden door de sorteerbedrijven? En zou je daar misschien een lijstje van kunnen delen?

Ik ben met name benieuwd of er een opsplitsing is van verschillende synthetische textielen, aangezien mijn eigen project dus over Modal gaat en dat ook een synthetische stof is. Deze stof heeft wezenlijke verschillen met bijvoorbeeld polyester of nylon, maar misschien zijn die verschillen voor de toepassing van jullie eindproduct minder relevant. Binnen de principes van Circulaire Economie zou het natuurlijk wenselijk zijn om stromen zo puur mogelijk te houden en ik denk dat het mogelijk is om dit met het Modal voor elkaar te krijgen. Als er voor die specifieke stroom echter geen goede mogelijkheid is tot recyclen, is het niet de moeite waard om deze stroom apart te sorteren en kan hij misschien beter samengevoegd worden met andere synthetische stoffen zodat het volume efficiënter verwerkt kan worden.

Nogmaals dankjewel voor je antwoord, dit geeft een duidelijk inzicht in de textielverwerkingsindustrie dat ik hiervoor nog niet had!

Groeten,

Odmar Vandijck

Their second answer.

Hi Odmar,

Geen probleem hoor. Textiel recycling en ook sortering is erg complex en graag zou ik het je helemaal van A tot Z uitleggen, maar dan zijn we volgend jaar nog niet klaar ben ik bang. Heel kort gezegd is de sortering altijd nog voor het grootste deel gefocust op hergebruik/export - daaruit vloeien dan ook de meeste type categorieën. De sortering gebeurd (nog) allemaal handmatig en je kunt dus niet vragen om te sorteren op bijvoorbeeld 95% polyester en 5% katoen - daarvoor zijn, naast dat je het met je blote oog niet kunt zien, ook de totaalvolumes te hoog en de output te weinig. Je kunt voor meer details over sortering het beste met onze moederonderneming Boer Group contact opnemen, die hebben daar meer verstand van als ik!
De eindsamenstelling (of dat nou gaat om de non-woven, vilt industrie of het maken van nieuwe garens) is afhankelijk van de wensen van de klant. Omdat we werken met post-consumer kleding/textiel en de grondstoffen daarin zo fluctueren kunnen we inderdaad nooit met zekerheid zeggen dat een materiaal voor 100% uit een bepaalde grondstof bestaat of dat er bepaalde materialen absoluut NIET in aanwezig zijn. Bij vervezelen is naast de samenstelling de structuur (binding) heel erg belangrijk; hoe dichter het op elkaar geweven of gebreid zit, hoe moeilijker wij het uit elkaar kunnen halen. Een gecoat textiel is hiervoor dus niet geschikt.

Net als samenstellingen is het dus ook niet mogelijk om zomaar synthetische grondstoffen van elkaar te kunnen onderscheiden. De inzameling en sortering van textiel gebeurd met zulke grote volumes, dat het niet mogelijk is om even bij elk type het kaartje (als die al aanwezig is) te lezen, een brandproefje te doen of microscopisch beeld af te nemen. Dat gezegd hebbende, al zou je alle 100% Modal textiel van de wereld bij elkaar hebben gesorteerd, dan moet er inderdaad nog een techniek zijn om het te kunnen recyclen én heb je daar natuurlijk ook afzet voor nodig. Dat geldt ook als je het uiteindelijk samenvoegt met een ander synthetisch materiaal! Het hangt dus allemaal erg nauw aan elkaar vast en het een moet het ander daarnaast ook (economisch) kunnen rechtvaardigen.

Appendix H: Calculations of the circular business model

This sheet is provided separately. Sources are included there.

1. Rough estimate of the amount of clothes/phones that get recycled compared to the amount sold. Assuming everything sold & recycled would be T-shirts and all would be sold at the same price: better statistics were not available and a rough estimate was enough.

Impact stats of companies with a recycling program			
Amount	Unit	Comment	Source
Patagonia			
101706	Repaired	Repaired clothes in 2020	https://www.patagonia.com/our-footprint/
€ 209.100.000,00	€	Revenue in 2021	https://www.zippia.com/patagonia-careers-213543/revenue/
47622	pounds	Pounds of recycled clothes 2020	https://www.patagonia.com/on/demandware.static/-/Library-Sites-PatagoniaSh
21601	kg	Kg recycled	1 pound = 0,45359 kg (Google)
144006	shirts repaired	Estimate in amount of tshirts (150g/shirt)	https://silverbobbin.com/how-much-does-t-shirt-weigh/
10455000	shirts sold	Sales if an average product would cost 20 eu	Assumption of average price/product, Patagonia is a high-end brand
2%	% repaired, resold, recycled	Estimate of amount of clothes that get recycled	
Fairphone			
17000	Phones recycled		https://shop.fairphone.com/en/recycle
95000	Phones sold		https://www.fairphone.com/wp-content/uploads/2021/06/Impact-Report-2020-
18%	Recycled/sold	Recycled are not only Fairphones!	https://www.fairphone.com/wp-content/uploads/2021/06/Impact-Report-2020-
H&M			
140000000	kg recycled	Post-consumer, since starting in 2013	https://hmgroup.com/sustainability/circular-and-climate-positive/recycling/
103703704	shirts recycled/year	Estimate in amount of tshirts (150g/shirt)	https://silverbobbin.com/how-much-does-t-shirt-weigh/
€ 23.070.000.000,00	€	Revenue 2021	https://companiesmarketcap.com/h-m/revenue/
2307000000	Shirts sold	Sales if an average product would cost 10 eu	Assumption of average price/product, H&M is a discounter
4%	% resold, recycled	Estimate of amount of clothes that get recycled	

2. Calculations of cost for the return system and time spent by workers based on 2.000 returns (price buildup stays the same with increasing scale of sales).

Scale of returns (in no. bras/year)	2000	bras/year	Estimate of resource flow in Total business model (pass on + pre-loved)				
Time estimate (per bra)	**Amount**	**Unit**		**Industrial processing**	**Amount**	**Unit**	
Return processing	5	min/bra	Estimate	Bra weight	100	g	Weight of prototype
Quality control: Decide on further processing	10	min/bra	Estimate	Washing machine capacity	8	kg	https://www.dewitwasserij.nl/wasserette/
Repair & touch up if necessary	30	min/bra	Estimate	Working hours per wash	100	min/wash	Estimate of: transport to washing machine,
Industrial cleaning	1,25	min/bra	Estimate	Working hours per bra	1,25	min/bra	Calculation
Prepare for resale: Photo, price, upload/deliver	5	min/bra	Estimate	Price per wash	6,05	€/wash	Based on an 8kg wash (https://www.dewitw
Resale processing	5	min/bra	Estimate	Price per bra	€ 0,08	€/bra	Calculation
Total working hours return processing/bra	56,25	min/bra	Calculation				
				Other random facts	**Amount**	**Unit**	
Total cost per bra	**Amount**	**Unit**		Renting an industrial washer	0,17	€/wash	5 x 10kg wasgoed per dag, 250kg wasgoed p
Return envelope + stamps etc	€ 5,63	€/bra	PostNL	Working hours per year	1875,0	h/year	Calculation
Labour	€ 11,19	€/bra	Calculation	Working hours per month	156	h/month	Calculation
Repair material	€ 2,00	€/bra	A few threads and spare fabrics?	Clothing dye	€ 11,35	€/pod	https://www.bol.com/nl/nl/p/dylon-wasma
Redyeing the bra	€ 1,89	€/bra	https://www.dylon.nl/nl/home/gebruik-en-tips/	Minimum wage per hour	€ 11,94	€/h	https://mi https://www.salarisvanmorgen.r
Washing	€ 0,08	€/bra	Calculation				
Total price return process (per bra)	€ 20,79	€/bra	Calculation				

3. Calculations of cost for the return system with 200 returns (price buildup stays the same with increasing scale of sales).

Scale of returns (in no. bras/year)	200	bras/year	Estimate of resource flow in Total business model (pass on + pre-loved)				
Time estimate (per bra)	**Amount**	**Unit**		**Industrial processing**	**Amount**	**Unit**	
Return processing	5	min/bra	Estimate	Bra weight	100	g	Weight of prototype
Quality control: Decide on further processing	10	min/bra	Estimate	Washing machine capacity	8	kg	https://www.dewitwasserij.nl/wasserette/
Repair & touch up if necessary	30	min/bra	Estimate	Working hours per wash	100	min/wash	Estimate of: transport to washing machine, v
Industrial cleaning	1,25	min/bra	Estimate	Working hours per bra	1,25	min/bra	Calculation
Prepare for resale: Photo, price, upload/deliver	5	min/bra	Estimate	Price per wash	6,05	€/wash	Based on an 8kg wash (https://www.dewitw
Resale processing	5	min/bra	Estimate	Price per bra	€ 0,08	€/bra	Calculation
Total working hours return processing/bra	56,25	min/bra	Calculation				
				Other random facts	**Amount**	**Unit**	
Total cost per bra	**Amount**	**Unit**		Renting an industrial washer	0,17	€/wash	5 x 10kg wasgoed per dag, 250kg wasgoed p
Return envelope + stamps etc	€ 5,63	€/bra	PostNL	Working hours per year	187,5	h/year	Calculation
Labour	€ 11,19	€/bra	Calculation	Working hours per month	16	h/month	Calculation
Repair material	€ 2,00	€/bra	A few threads and spare fabrics?	Clothing dye	€ 11,35	€/pod	https://www.bol.com/nl/nl/p/dylon-wasma
Redyeing the bra	€ 1,89	€/bra	https://www.dylon.nl/nl/home/gebruik-en-tips/	Minimum wage per hour	€ 11,94	€/h	https://mi https://www.salarisvanmorgen.n
Washing	€ 0,08	€/bra	Calculation				
Total price return process (per bra)	€ 20,79	€/bra	Calculation				

4a. Cost buildup of bras. Production cost is a rough estimate, this calculation excludes all operational costs that are not directly involved in the supply chain of the circular business model (for instance marketing, website, development, support etc).

LEGEND:
Calculated value
Manually inserted value

Sales price (new bra)	€ 60,00	€/bra	Assumed production + system cost *3

Estimate of resource flows	Amount (% of sold)	Amount (#)	Revenue of system	
Sold new bras	-	8000	€ 360.000,00	Total revenue of sold bras
Sold pre-loved bras	5%	400	€ 1.683,58	Hard to sell, 1/20 bras is probably optimistic, even if return is promoted
Refurbished passed-on bras	20%	1600	€ -33.265,67	Hopefully, 1/5 of customers will be inspired to pass on their bra (with free refurbishment)
Recycled bras	5%	400	€ -	This is the amount that is returned and cannot be resold. Cost/revenue of this system is assumed negligable
Lost after usephase	70,00%	5600	€ -	These bras never come back to Feelou
Bras with 1 repair/lifetime	10%	800	€ -13.268,00	With free repairs, it is estimated that 1/10 of bras will be sent back for repairs (excluding refurbishment for both pass-on and resale)
	Total revenue:		€ 315.149,92	*Assuming 1 batch of 8000 bras with a full service model (=repair, refurbish, resell)*

Operational cost (per new bra)	Amount	Unit	
Cost of production	€ -15,00	€/bra	*Estimate*
Free refurbishment with pass-on	€ -4,16	€/bra	Total cost/% of bras going through system
Free repairs	€ -1,66	€/bra	Total cost/% of bras going through system
Cost of resale system	€ -	€/bra	Loss of system/% of bras going through system
Total PSS cost	€ -20,82	€/bra	

Revenue of return system (per pre-loved bra sold)	Amount	Unit	
Refurbishment costs	€ -20,79	€/bra	Total cost as calculated in the "Return system" sheet
Sales price	€ 25,00	€/bra	*Estimate, assuming all refurbished bras are sold*
Loss/revenue per bra	€ 4,21	€/bra	Negative = loss, positive = revenue

If refurbishment can be done at a profit, this could show that a circular businessmodel is not only ethical, but also a viable businessmodel

4b. Cost buildup of the repair system.

Scale of repair (in no. bras/year)	800	bras/year	Estimate of resource flow in total business model calculations

Time estimate (per bra)	Amount	Unit	
Return processing	5	min/bra	Estimate
Quality control: Decide on further processing	10	min/bra	Estimate
Repair & touch up if necessary	30	min/bra	Estimate
Total working hours return processing/bra	45	min/bra	Calculation

Total cost per bra	Amount	Unit	
Return envelope + stamps etc	€ 5,63	€/bra	PostNL
Labour	€ 8,96	€/bra	Calculation
Repair material	€ 2,00	€/bra	A few threads and spare fabrics?
Total price return process (per bra)	€ 16,59	€/bra	Calculation

Other random facts	Amount	Unit	
Working hours per year	600,0	h/year	Calculation
Working hours per month	50	h/month	Calculation
Minimum wage per hour	€ 11,94	€/h	https://mi htt