Developing sustainable service design for a pay-per-use dryer

Master Thesis

Shengling Wei

Master Graduation Thesis

Delft, August 2020

Author | Shengling Wei

MSc. Strategic Product Design

Faculty of Industrial Design Engineering

Delft University of Technology

Chair | Prof. dr. ir. Ruth Mugge

Mentor | Dr. ir. Sonja van Dam

Company | HOMIE B.V.

Company Mentor | Colin Bom

Preface

Dear Reader,

With this thesis, I finalize my master of Strategic Product Design at Delft University of Technology. In the past half-year, I worked on this project with HOMIE and applied my theoretical and practical knowledge I have gathered in strategic product design into this project.

2020 is a special year and made people on this planet start to look at the world they live in differently. People become more cherished in their lives and take a more serious view on sustainability. I am glad that I can make use of my knowledge to explore how to create a more pleasant and sustainable future.

I want to thank all people who supported me during this graduation project:

First, I would like to thank my supervisor team. Thank you, Ruth, for your vibrant knowledge in behaviour change and sustainability, your valuable feedback, on-point advice, and your sense of humour. Thank you, Sonja, for your supportive insights, incredibly helpful research suggestions, and always kindly listen to my thoughts. Thank you, Colin, for your practical feedback and knowledge from the company perspective and giving me the freedom to create my concepts.

Special thanks to the experts from HOMIE. Thank you, Beau, for helping me to arrange interviews and sharing your customer-related insights. Thank you, Ming, for giving me insights into technical capabilities. Thank you, Paul, for offering me an overview of the collaboration situation and partnership challenges.

I also want to thank all participants in my research, creative sessions, and validation interviews, thank you for sharing your experiences, opinions, and suggestions on this topic.

Additionally, I would like to thank all my friends who always take their time to listen to me, sharing their honest advice, and supporting me in both work and life, especially during the social distancing period.

Last but not least, I want to thank my parents, who made all this happen.

Thank you all for supporting me in this adventure.

Stay safe, stay calm, stay positive and curious, and I hope you enjoy reading.

Shengling Wei

Executive Summary

The world today is facing an increasingly severe environmental problem. Therefore, manufacturers, designers, product/service providers are innovating for more sustainable products. Meanwhile, consumers are becoming more aware of sustainability and are willing to choose eco-friendly products/services. However, there are still gaps between satisfactory user experience and real-sustainable use behaviours. And it is hard for companies to understand what users need during sustainable use experiences. Previous studies investigated the influencing factors of persuading consumers to accept and perform sustainable-related behaviour change. As for laundry behaviours, the detailed influencing factors of the sustainable use of the washing machine was identified. But the specific influencing factors of sustainable dryer use behaviours are still unclear.

Hence, the objective of this thesis is to ***figure out the influencing factors in dryer use experiences and investigate how to persuade the users to use a pay-per-use dryer more sustainably***.

This project is done with Homie B.V., who offers pay-per-use service and wants to achieve a more sustainable white goods industry through a Pay-Per-Use business model. The project is focused explicitly on the pay-per-use dryer model but keeps an eye on the entire service of the company.

From a literature review and twelve customer interviews, the key influencing factors in accepting and performing sustainable dryer use behaviours were investigated and concluded in a behaviour model. A usage data analysis further proved that financial concern is not a deciding factor of performing sustainable actions, but the convenience concern is. The drivers and barriers generated the design challenge and design requirements, which contribute as a guideline to the design solution.

The final design is a service strategy called HOMIE STAR plan, which uses a mobile app as a communication channel for providing a set of services. The service plan has two phases: the onboarding month and every 6-month evaluation. Customers can learn how to make use of the services and tools to dry their laundry sustainably and conveniently in the onboarding month and achieve sustainable goals by becoming a good laundry organizer in daily use. The service patterns to help customers perform sustainable dryer use behaviours are (1)dryer setting instructions with environmental impact; (2) a HOMIE Planner with sustainable-oriented recommendation system that connects to customers' daily schedule; (3)a community with quick Q&A and tips sharing; (4) a rewarding system with usage cost details.

The prototyped concept and implementation suggestions were proposed and validated through interviews with potential dryer users, existing HOMIE customers, and HOMIE employees.

HOMIE STAR plan made use of the identified influencing factors to persuade users to perform sustainable dryer use behaviours and meanwhile developed HOMIE's pay-per-use model services. The strategy provided HOMIE with a future direction of realizing its service value and sustainable goals on a larger scale and longer-term and suggested potential collaboration opportunities to influence other parts in the supply chain of the white goods industry.

Content

Introduction

Introduction

1.1 Background

Nowadays, the circular economy becomes an increasingly crucial topic that generates new business models, enhancing competitiveness, and offers new job opportunities (Maria Antikainen, Katri Valkokari, 2016). However, sustainability sometimes seems to still be an "expensive" and "inconvenient" approach for customers (Blowfield, 2013), and "less viable" business for companies. Therefore, finding out the value of sustainable business models in creating better user experiences, achieving sustainable economic growth and making a long-term environmental impact become essentially important.

The graduation project is focused on Homie B.V. (hereinafter referred to as “HOMIE”), who wants to achieve a more sustainable white goods industry through a Pay-Per-Use business model.

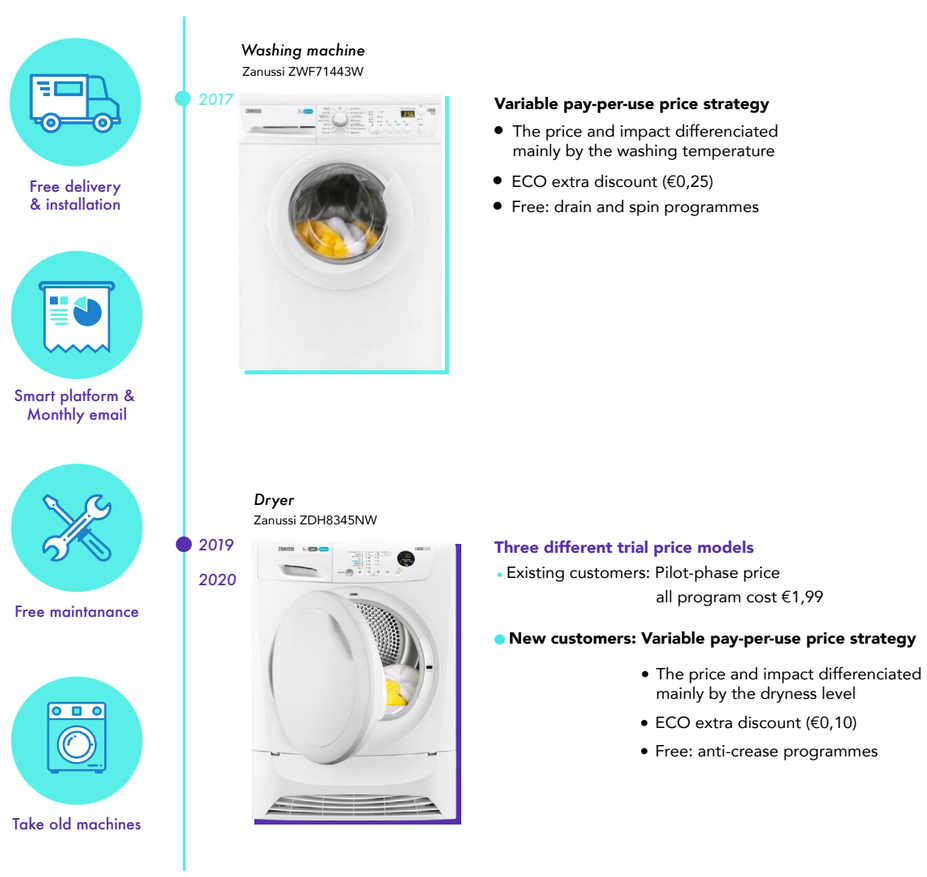


Figure 1. Current HOMIE Pay-Per-Use Products and Pricing Schemes

HOMIE’s Pay-Per-Use model aims to achieve sustainability in two directions. The white goods are accessed by users instead of owned by them, which enhances the durability of the white goods, and offers OEMs the opportunity to produce higher-quality equipment with a long service life. This provides the product with more use cycles. Meanwhile, the Pay-Per-Use model encourages sustainable user behaviours such as reusing appliances and reducing energy consumption.

The first HOMIE pay-per-use washing machines were introduced in 2017. This pay-per-use service contains high-quality washing machines (mostly are used but well-maintained), an at-least 6-month contract, free delivery and installation. By using a built-in tracker, HOMIE keeps track of the data on the machine usage, and charges customers the using fee accordingly. Customers can always check their own usage data on the website and will receive monthly summary emails.

In October 2019, HOMIE introduced their first pay-per-use dryer, which contains a built-in tracker as well. Currently, HOMIE operates two different trial price models:

· Pilot-phase price: €1.99 per drying cycle (with existing customers)

· A variable price strategy *(Figure 1)*

Similar to the HOMIE washing machine model, the future pricing range of HOMIE pay-per-use dryers need to base on HOMIE’s own consumer needs of reasonable pricing per use, which generates viable business value and is effective in stimulating sustainable consumption.

In 2017, Bocken et al. introduced the HOMIE Experimentation roadmap which illustrated how a pay-per-use business model can help stimulate sustainable consumption patterns in different approaches and phases *(Figure 2)*. Most of the experiments have already been applied by HOMIE and helped stimulate sustainable washing behaviours. In combination with specific context analysis, the future pay-per-use dryer model can be inspired by these experimentations and optimize the existing services in promoting sustainable dryer use behaviours.

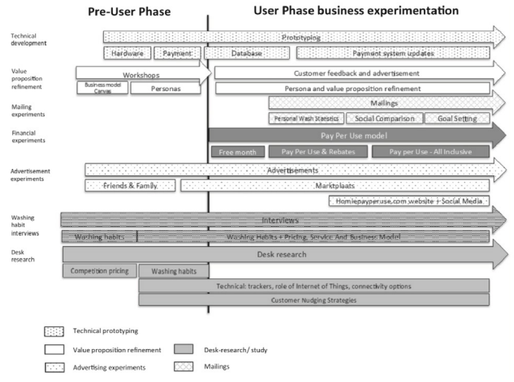


Figure 2. HOMIE experimentation roadmap (Bocken et al., 2017)

1.2 Problem definition

HOMIE has already launched the pay-per-use washing machine since 2017 and promoted this service model. Their customer group is growing successfully. However, the dryer using conditions and related behaviours are different from those of the washing machine.

Customer needs

In using phase, for instance, instead of the temperature of washing, dryers have different dryness levels and consumers may value more the effectiveness of drying cycles. Hence, dryers have other potential influential factors(e.g. dryness, time, refresh need, using frequency, etc.) in terms of sustainable using experience.

Customer journey

Different times in a day the customers use the dryer may affect their energy consumption. For instance, during the day, the customers can choose to hang the slightly moist laundry in the sun, while in the evening, they may solve this problem by running another cycle. Customers' schedule may also affect the time they are willing to spend on drying.

Customer segments
Customers with different household sizes may have different extent of dependence on dryers. Therefore, the same influencing factors, including price, may have different effects on their sustainable dryer use behaviours.

Hence, the goal of research is ***to figure out the influencing factors in dryer use experiences and investigate how to persuade the users to use a pay-per-use dryer more sustainably.***

The main research question is:
Q1. What are the influencing factors in sustainable dryer use behaviours?

As mentioned above, HOMIE is trialling two different pricing strategies. To figure out whether and how the pay-per-strategy can help stimulate a more sustainable drying use behaviour, two layers of problem need to be solved:

Q2. To figure out which pricing strategy is most successful in stimulating sustainable behaviour;

Q3. To find out which strategy is most acceptable to different customer segments(i.e. Customers with different household sizes).

Thus, research and design are required to help HOMIE develop the best results in terms of environmental impact, customer satisfaction and business viability.

1.3 Assignment and approach

1.3.1 Assignment

By answering the research questions, a strategic solution is supposed to be designed for developing a pay-per-use dryer price model and a product-service plan. The design needs to be based on HOMIE's current capabilities and opportunities, users real needs and concerns, and market trends. This thesis will consist of the following:

1. Research insights defined in terms of trends, circular business strategy, sustainable design, company, consumers, factors impact consumer dryer using behaviour.
2. A value proposition and pay-per-use dryer service solution that HOMIE offers to its customers.
3. A strategic promoting plan for the pay-per-use dryer service.
4. Internal process and external collaborations that are based on current and required capabilities as well as resources.
5. Recommendations for future strategy.

1.3.2 Project Approach

The design is planned according to the Double Diamond framework and divided into 4 phases, *Discover*, *Define*, *Develop* and *Deliver*. During the research and *Discover* phase, approaches such as literature review, customer journey, service blueprint, offering map, SWOT analysis were used. During the *Define* phase, influencing factors related to dryer use behaviour change were defined and assumptions were tested, both by qualitative interviews and quantitative experiments. After bringing perspectives together, a detailed problem definition and design goal were proposed. A set of pay-per-use dryer service scenarios were then be created, evaluated and developed into a final concept. Finally, the concept was validated and iterated by interviews with users and the company.

"To design a strategic solution, including a best pay-per-use dryer price model and a product-service plan, that is desirable, feasible, viable, and can achieve business value, customer satisfaction, and sustainability."

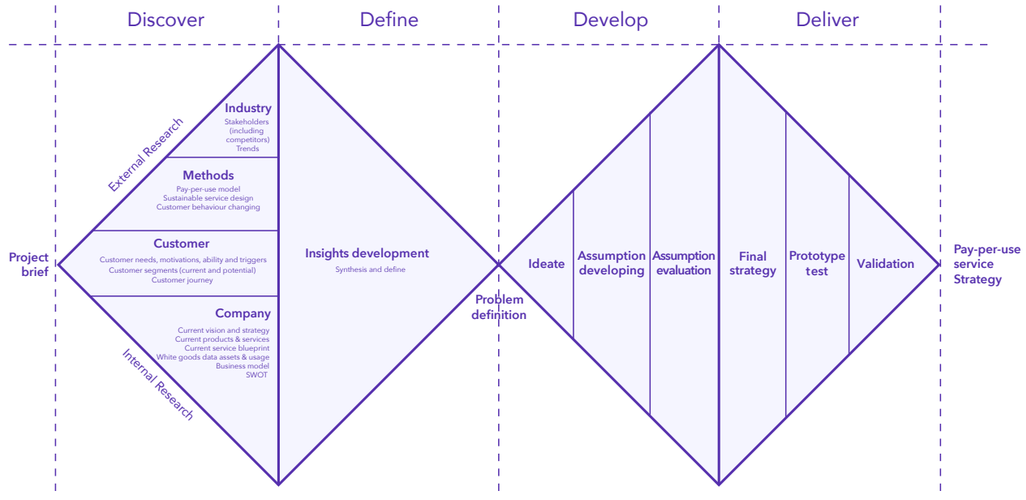


Figure 3. The approach based on the traditional Double Diamond design process (Design Council, 2019)

Limitation

For HOMIE's existing group of customers, the sustainable washing behaviours they have built up through their use of the pay-per-use service might influence their dryer using behaviours as well. Consequently, as the pilot phase is only conducted with these existing customers with a fixed price (€1.99 per drying cycle), the results might have biases. Since the time of this research is limited, questions such as whether user behaviour would vary in different seasons could hardly be answered.

Conclusion

This chapter introduced the design background, challenge, and assignment of this project. The coming chapters will explain how each design goal was achieved in detail.

Takeaways from this chapter

- HOMIE aims to achieve a sustainable white goods industry through a pay-per-use business model. The company is now introducing its new pay-per-use dryer model, where the service needs to be further developed as users have different needs and concerns in terms of dryer use.
- The scope of this project is on sustainable dryer use consumption and behaviour, customer dryer use experience and the business value generation for HOMIE.
- The envisioned design aims to develop a pay-per-use service strategy for HOMIE customers that is desirable, feasible, viable, and can achieve business value, customer satisfaction, and sustainability.

Theoretical Analysis

Theoretical Analysis

This chapter provides an overview of existing theories and trends about Product-service systems, Pay-Per-Use business model, and the influencing factors of sustainable consumption behaviours. At the end of this chapter, a behaviour model is plotted. The motivations, abilities and triggers in the model (i.e. influencing factors) are used to understand how to persuade users to accept and act on sustainable behaviour change.

2.1 Product-service systems(PSSs)

2.1.1 What is Product-service Systems

Product-service Systems(PSSs) is a business model that provides functional value to end-users by cohesive delivery of products and services (Tukker, 2004). Through this approach, consumers can be transformed to users, which could not only support companies to keep product ownership for easier maintenance but also extend the responsibility of product producers to end-users "as part of the purchase agreement"(Probst, Frideres, Cambier, PwC Luxembourg & Sarah Lidé, PwC Sweden, 2016). Meanwhile, PSSs approach can provide opportunities for promoting sustainability(Tukker, 2004, 2015). Mont (2008) notes that under the PSSs model, customers purchasing products use or its functions instead of purchasing product ownership. Customers can rent, upgrade, redesign, or lend the product instead of owning, which can help prevent the product from being abandoned within its service life. In this way, the durability and quality of products can be enhanced (Heiskanen and Jalas, 2003; Tukker, 2004). In addition, companies can build up direct contact and long-term relationships with customers through PSSs, which can thus enhance customer satisfaction(Mont, 2002; Tukker and Tischner, 2006; Armstrong, Niinimäki, Kujala, Karell, Lang, 2015). Furthermore, by building up a product-service system, a supply chain with a fine-grained collaboration network with various stakeholders can be established "with low capital intensity"(Tukker and Tischner, 2006; Van Halen et al., 2005). Companies can benefit from the PSS business model and make achievements in customer experience, business value and sustainability.

HOMIE's service model involves the company, manufacturers, logistics companies and already managed to offer users a good laundry washing experience. The future HOMIE dryer use experience needs to continue making use of the characteristics of PSS. By understanding customers' specific needs regarding laundry drying in the entire service system, HOMIE has the opportunity to promote sustainable consumption by offering deeper product-service satisfaction. Since selling service is more flexible than selling a single product, HOMIE can offer various service units based on different types of customer needs. Meanwhile, as the number of competitors in the market is increasing, HOMIE's dryer model needs to differentiate itself from other companies who offer laundry drying service, thus occupying more market percentage. Therefore, it is vital to understand "what to serve" and "how to serve" the customer at different service touchpoints based on the sustainable laundry drying context.

2.1.2 Pay-per-use business model

Tukker(2004) introduced three types of PSSs, product-oriented, use-oriented, and results-oriented. Pay-per-use model, as a results-oriented PSS, offers companies the access to sell function units instead of ownership to customers. Companies can be incentivised by pay-per-use to integrate sustainability considerations in business. Probst et al.,(2016) mentioned that pay-per-use can achieve more efficient resource management, increase recycle rate and reduce waste. Pay-per-use encourages companies to focus on greater durability and longer life cycles of their products(Tukker, 2004; Probest et al., 2016).

Pay-per-use models can not only contribute to sustainability but also customer satisfaction. Companies offer affordable access to traditionally costly products and take care of the technology risk, which brings customers substantial cost benefits. By providing services, companies can build frequent communication connections with users and thus enhancing customer loyalty. Moreover, more direct communication can help companies better understand customer needs and thus gain more innovation inspirations(Probst et al., 2016).

However, pay-per-use means longer payback time than direct sales (Tukker, 2004). This means companies may be under bigger pressure of cash flows. Furthermore, as customers only pay by use, the revenue is less predictable than other subscription models such as monthly leasing(Reason Street, 2018). Therefore, companies need to be more careful about customer decisions.

The impact of the pay-per-use model on customers in terms of sustainability is discussed by prior researches. Bocken et al.,(2018) proved that pay-per-use models can encourage sustainable consumptions. Consumers would use the product less often since each additional use means higher costs for them. Furthermore, variable pricing schemes can also influence customer decisions and thus incentivise sustainable consumption.

HOMIE makes use of its pay-per-use model to achieve a more sustainable household appliances industry. It's washing machine model proved that a pay-per-use model can stimulate more sustainable laundry washing behaviour(homiepayperuse.com). With reasonable cost and flexible contract, HOMIE's pay-per-use model can not only attract environmentally conscious customers but may also attract a larger range of customers who care less about sustainability. In addition, HOMIE has the opportunity to reach larger and wider customer groups by targeting specific preferences of various market segments(Bocken et al., 2018). Meanwhile, HOMIE needs to reduce the pressure on cash flows. Thus, it is necessary for HOMIE to better understand the needs of different customer segments to develop a larger customer group. The next section will investigate the influencing factors identified by prior studies in terms of sustainable consumption behaviours, which can be reference and inspiration for this project.

2.2 Dryer using and laundry behaviours

2.2.1 The Fogg behaviour model

Fogg (2007) introduces that to persuade people for performing a certain behaviour, three factors need to take place at the same time: *Motivation*, *Ability*, and *Triggers*.

Motivation refers to people's pleasure and pain, hope or fear, and social acceptance or rejection. Users have different needs and concerns towards a certain service/product, which are the motivations

Figure 4. The Fogg Behaviour Model(2007)

for them to perform a behaviour. *Ability* refers to the elements of simplicity, such as time, money, effort, social deviance and the fit of routine, which varies by the context from individual to individual. People are more willing to act a certain behaviour when it is simple, especially when their motivations are relatively low. *Triggers* refer to the things that make people actually take action, such as a spark, facilitator, and signals. The triggers need to happen at the right moments, which implies that it is essential to understand users' specific needs along the user journey.

The motivation, ability and triggers can act as drivers and barriers towards certain behaviour, which varies by the individuals and context. Therefore, understanding what and why do different customers perform sustainably/unsustainably during the dryer use journey becomes rather critical for HOMIE. By making use of the behaviour model framework, HOMIE can look into its current approaches of encouraging sustainable consumptions, and investigating new opportunities of promoting sustainable dryer use behaviours in a service system.

2.2.2 The influencing factors of sustainable consumption behaviours

Frank-Martin and Peattie(2019) state that sustainable customer behaviour is characterized by the type of products consumers select, the way the products are used, and how consumers would dispose of the products based on their individual sustainability goals. Therefore, this thesis focuses on sustainable consumption behaviour as to whether consumers **accept** and **achieve** lower energy consumption, making more efficient use of products and higher use duration of products.

Kobus et al. (2013) discuss that the likelihood of behaviour change is contributed by the joint effect of user's motivation, contextual factors and the design of the system. This matches the behaviour model proposed by Fogg (2007). The main drivers and barriers related to the customer decision and behaviours of a sustainable oriented service are mapped into a behaviour table(*Figure 5*) and explained below:

Drivers - motivation

Customers can be motivated to accept and behave in a more sustainable way by multiple factors.

As for accepting sustainable PSS models, Ebring et al. (2015) emphasized that customer attitude to alternative models of consumption are more likely to be motivated by economic reasons. Additionally, Armstrong et al.,(2015) showed that customers have a more positive view on various PSS scenarios when considering environmental benefits, especially when the service is associated with product longevity. Besides, Armstrong et al. (2015) emphasize that customers can benefit from PSS with deeper product satisfaction. Moreover, the dynamics of the relationship between consumer and provider can be another influencing factor of PSS based sustainable consumption(Raja et al., 2013). This includes customers' trust towards providers of functions or services(Catulli et al., 2013; Schmidt et al., 2014; Armstrong et al., 2015). Furthermore, flexibility, guaranteed access, temporary nature of use, and opportunity to test can attract young customers to choose PSS services, especially for the products that require maintenance and upgrade (Edbring et al., 2015).

As for achieving sustainable energy consumption, financial reasons also play an important role. Waston, Viney and Schomaker(2002) proposed that users can be less sensitive to electricity usage due to the relatively cheap price. Kobus et al., (2013) investigated that users are more likely to change to sustainable energy consumption behaviour when motivated by environmental issues. Besides, service enjoyment has a considerable impact on customer energy consumption(Watson et al., 2002). Moreover, customers can be motivated to consume energy more sustainably by reward, social responsibility and "their roles for using the system" (Kobus et al., 2013).

HOMIE's current service has targeted some of the motivation factors mentioned above. For instance,

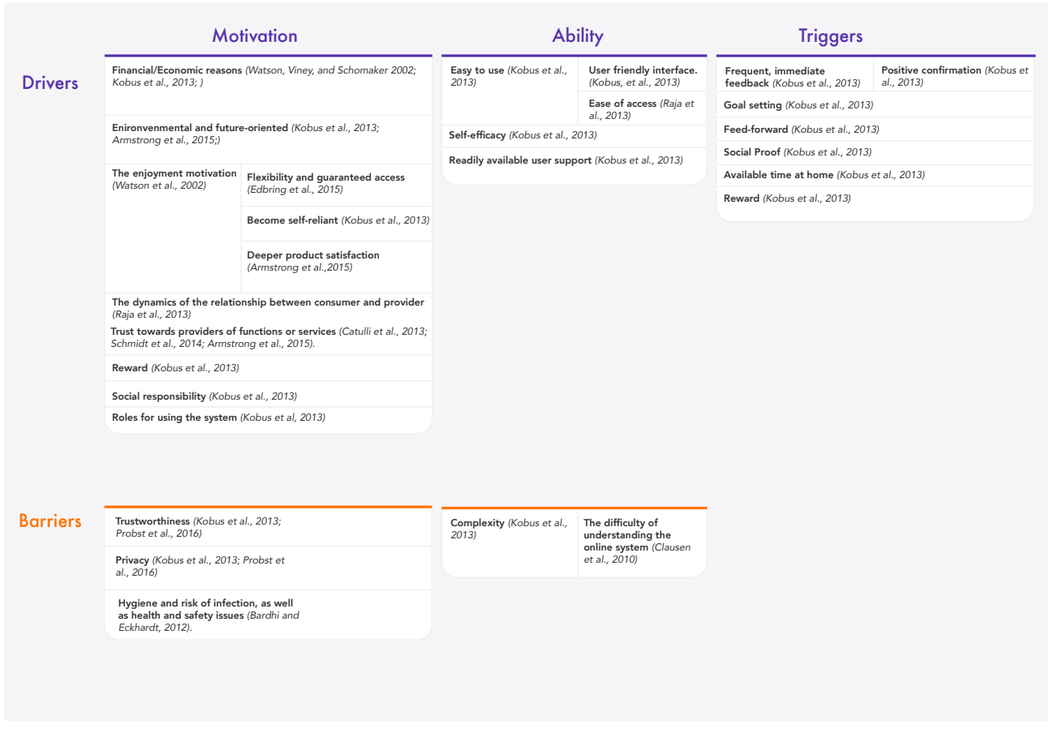


Figure 5. Influencing factors of accepting and performing sustainable behaviour changes

the reasonable pricing motivates customers who are cost-conscious to choose the HOMIE product-service and use the environmental friendly settings with lower price. The friendly service and fast communication build up the dynamic relationship between customers and the company, which then enhances customers' trust towards HOMIE and its service, thereby motivates them to follow the sustainable consumption recommendations provided by HOMIE. However, there are still opportunities for HOMIE to improve. For instance, HOMIE's current dryer use feedback does not involve social comparison yet. And the role of operating the system and opportunity to test sustainable dryer programme settings are not sufficiently emphasized. Besides, there're more opportunities to be explored for motivating customers to use the dryer sustainably, which needs further investigation in customer research(*Chapter 4*).

Drivers - ability

When customers are motivated to consume more sustainably, they need to get enough ability to realize the behaviour change. As for a sustainable-oriented product or service, it is important to be easy enough for customers to understand and operate(Kobus et al., 2015; Raja et al.,2013). Meanwhile, companies need to make sure that customers believe they can use or operate the product/service. This also requires companies to offer readily available user support(Kobus et al., 2013).

HOMIE offers fast and supportive service for customers, which makes the product and service easy to use. The future pay-per-use dryer service needs to keep simple and clear, and make customers confident enough to engage in the sustainable consumption process, especially when HOMIE introduces new service patterns to its consumers.

Drivers - triggers

Context cues is another key element of behaviour change and habit trigger. Kobus et al. (2013) emphasized that frequent, immediate feedback and positive confirmation can trigger household sustainable energy-saving behaviours. They also emphasized that goal setting can help stimulate sustainable electricity consumption. Besides, customers' journey can be an influencing factor for sustainable consumption. For instance, customers' available time at home can impact on their decision to use solar energy for washing(Kobus et al., 2013).

Currently, although HOMIE provides a price stimulator on the company webpage and sends invoice emails as usage feedback to customers after each drying cycle, these can not serve as a trigger for customers to consider using more sustainable settings. This is because the feedback is not truly real-time, and customers are receiving this feedback passively. Therefore, looking for more communication channels and trigger opportunities becomes a crucial challenge for HOMIE.

Barriers

Prior studies also investigated barriers that make customers consume less sustainably. Customers may refuse to use sustainable service or change their consumption behaviour when the process is not easy(Clausen et al., 2010; Kobus et al., 2013). Besides, when the concept is too novel, customers may have a hard time to accept and follow(Mont, 2004; Edbring et al., 2015). Likewise, Catulli(2012) mentioned that customers may worry about accepting service or making a change when they feel uncertain about the rules of service. Moreover, factors such as privacy, hygiene, health and safety issues can also influence the initiative of customers to change their consumption behaviours(Kobus et al., 2013; Probst et al., 2016; Bardhi and Eckhardt, 2012).

Customers may use the dryer in a less-sustainable way for various reasons. By figuring out the barriers of sustainable dryer use behaviours, HOMIE can develop its service by turning the barriers to motivations. Meanwhile, HOMIE needs to be careful about the potential barriers for customers to accept the service from HOMIE.

Overall, it is investigated that HOMIE's pay-per-use model for washing machines can stimulate more sustainable behaviours (Bocken et al.,2017), but the research on sustainable dryer use behaviours is still rare. Therefore, to understand the exact impact of HOMIE's pay-per-use dryer, more research is required. Meanwhile, to develop a wilder customer group, it is necessary to better understand specific target groups' preferences. Therefore, HOMIE needs to figure out the influencing factors of sustainable pay-per-use dryer consumptions and make good use of these factors to persuade customers to be more sustainable while enjoying good service, which will be investigated in *Chapter 4*.

Theoretical Analysis

Takeaways from this chapter

- PSS models play an important role in stimulating sustainable consumption, enhancing customer satisfaction, and creating long-term business value. By developing its service, HOMIE can achieve a more sustainable dryer industry and build up a better customer relationship. It is vital to understand "what to serve" and "how to serve" the customer at different service touchpoints based on the sustainable laundry drying context.
- Pay-per-use models can offer more flexible service units for various segments of customers but have a long pay-back period. Therefore, HOMIE may need to look for solutions to reduce the pressure on cash flows.
- The influencing factors of customer sustainable behaviour change can be divided into motivation factors, ability factors, and triggers, which need to occur at the same time to make customers perform the desired behaviour. Currently, HOMIE only targets some motivations and abilities, and offers almost no triggers at the moment the intended dryer use behaviour starts.
- Prior studies have found out several influencing factors of customers' attitude towards sustainable service models and consumption behaviours, but the specific drivers and barriers of sustainable pay-per-use dryer use behaviours still have to be explored.

Company Analysis

Company Analysis

This chapter provides a detailed view of HOMIE. A value proposition analysis introduces what HOMIE offers currently and aims to offer soon. Next, a service blueprint, stakeholder map and business model canvas analyze the key business operation of HOMIE. Then, the existing and potential competitors in the market are analyzed. Finally, the SWOT of HOMIE concludes the key advantages and potential problems.

3.1 About HOMIE

HOMIE is a growing company which operates a pay-per-use business model for household appliances. Through this business model, HOMIE promotes sustainable consuming behaviour, develops and tests a more sustainable way of white goods industry. By using the IoT technology, HOMIE is able to collect the usage data by a build-in tracker, and give the users feedback by online webpages, invoice emails after each use, and monthly intervention emails. Meanwhile, HOMIE uses online surveys to better understand customers preferences and collect feedback. In this way, HOMIE offers pay-per-use household appliances and service that is affordable, worry-free, high quality and gives people the experience to live a sustainable and quality life.

3.2 Value proposition

3.2.1 Vision & Mission

HOMIE aims to achieve a more sustainable white goods industry through its pay-per-use business model. In the using phase, paying for use and different programmes encourage sustainable behaviours such as reducing energy consumptions. Meanwhile, the devices are used by users instead of owned by them, which enhances the durability of the white goods, which will impact back on the manufacturing phase. The OEMs will get the opportunity to produce higher-quality equipment with longer service life. Therefore, products will have more use cycles (*Figure 6*).

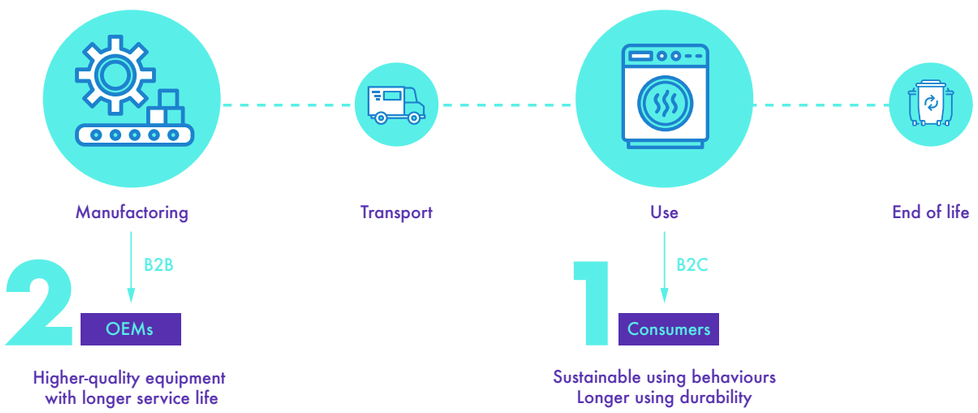


Figure 6. How HOMIE achieve sustainability through its Pay-Per-Use business model

3.2.2 Customer segments

Currently, HOMIE has over 100 pay-per-use dryer customers (*Figure 7*). The four main target customer segments of HOMIE are low-income customers (i.e. customers who care about affordable appliances), green Millenials(i.e. customers who care about sustainability), roamers(i.e. customers who care about flexibility) and shared housing customers (i.e. customers who do not value product ownership and are seeking for alternatives). However, HOMIE does not analyze the exact percentage of each customer segment, and can hardly distinguish the segments of its existing customers. In the market, HOMIE can attract more customers who are concerned with sustainability and financial costs. It may be a direction of HOMIE to also attract other potential customers such as family users who live a more stable life, consume more energy but concern less about the cost.

According to the reviews on Trustpilot, HOMIE has built a brand image with good service, reasonable cost, and sustainability that most of the customers are willing to recommend HOMIE to others (Trustpilot.com, 2020). However, it also shows that most current HOMIE users are with small household size and the duration of their subscription is relatively short. If HOMIE wants to target customers with larger household sizes that can continue using the service for a longer period, there are more things to do.

Hence, the goal of this research is to find out the needs and concerns in terms of dryer usage of different customer segments.

Current Target	**Existing customers**	**1217 customers have our washing machine (no dryer)** **40 customers have our dryer (no washing machine)** **92 customers have a washing machine and dryer**
	Concern sustainability customers	**Potential**
	Concern financial customers	**Potential**
Potential customers	**Understand their barriers and needs**	**Potential** **Family users - more stable, more consuming, different motivations**

Figure 7. HOMIE's existing and potential customer groups

Company Analysis

3.3 Current Offer

HOMIE offers washing power and drying power via its pay-per-use product-service models. Started from the HOMIE Pay-per-use Washing Machine in 2017, HOMIE offers free installation and maintenance of high-quality appliances. Customers pay per wash and there is differential pricing to encourage a lower energy consumption per cycle (i.e. lower prices are charged for lower temperature settings). With a built-in tracker, HOMIE managed to adapt the machines for the pay-per-use model by monitoring the laundry data of the customers besides invoicing per wash. An intervention email which contains usage data will be sent to customers at the end of each month(*Appendix 1*). Customers can check real-time usage data on the website(*Appendix 2*) and can get an overview of monthly usage by intervention emails, which can help raise the awareness of reducing washing usage and thus stimulating sustainable behaviour.

The HOMIE Pay-per-use Dryer has a similar strategy. However, the exact impact of different pricing models on sustainable consumption still needs to be discovered and determined.

Figure 8 plots the current service operation process in a service blueprint. A detailed customer journey analysis will be conducted in *Chapter 4*.

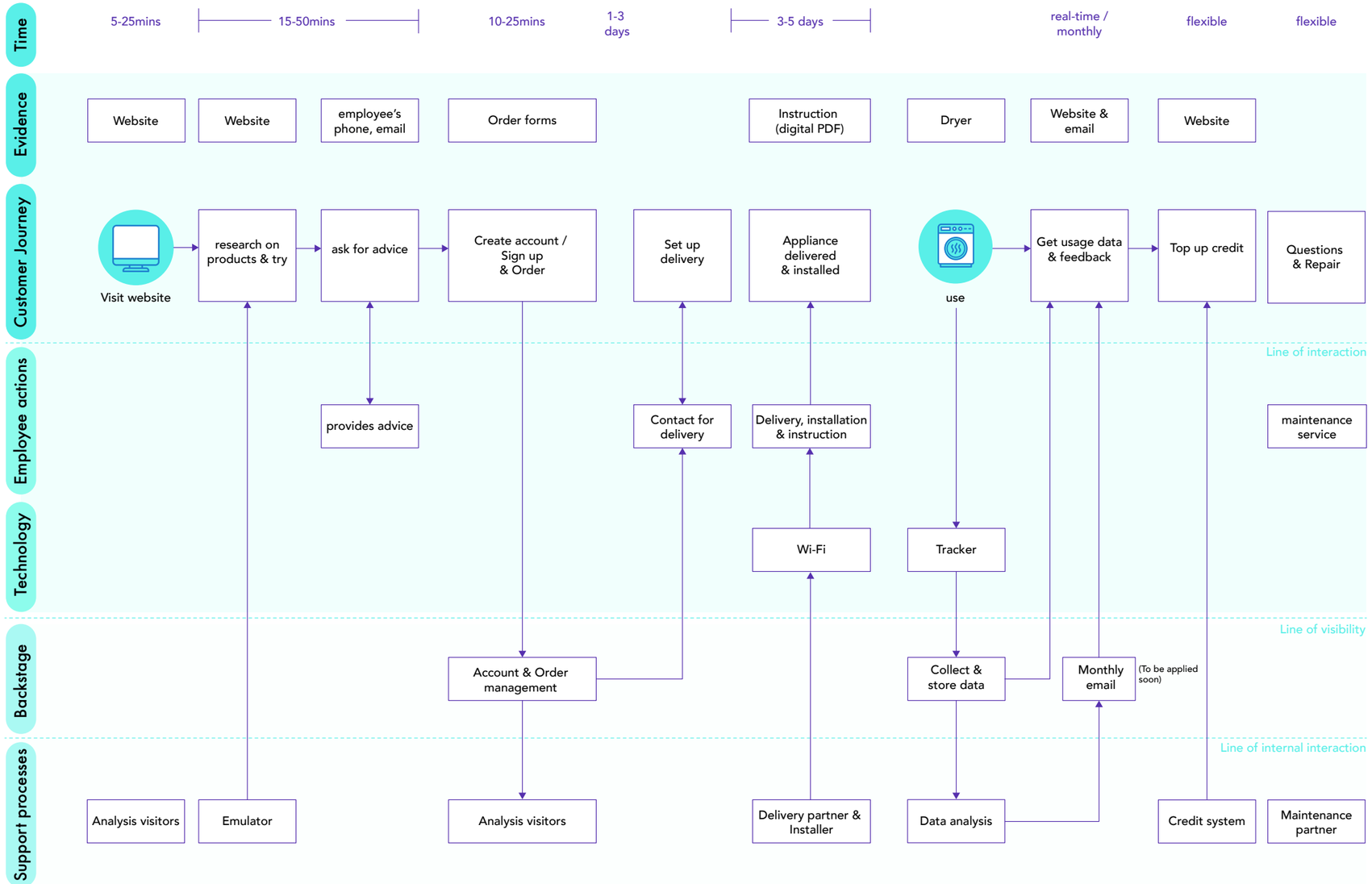


Figure 8. the current HOMIE service blueprint of the pay-per-use dryer

3.4 Stakeholders

HOMIE doesn't offer its pay-per-use dryer service alone. The basic idea of HOMIE is to stay small and outsource most of the services. Therefore, there are several stakeholders who play important roles in HOMIE's operation process. In this section, important stakeholders will be introduced according to the service blueprint mentioned in the last section. The information is confirmed by expert interviews with the Partnership Manager, the Chief Engineer, and Marketing & Communication expert from HOMIE.

Obbink

Obbink is an electronic product shop which operates both online shops and physical stores. HOMIE orders appliances from Obbink with a better price. Meanwhile, Obbink also offers HOMIE service agreement as a product option in their physical stores. As a part of its own service, Obbink also helps HOMIE with storage and delivery.

> *"And they do some of the ordering on our behalf because they have a better price. And they do some of the logistics, but not very much."*
>
> —— *Paul Dekker, Partnership Manager at HOMIE*

Electronic Logistics (EL)

Although HOMIE has its own deliveryman, EL plays an important role in HOMIE's product storage and logistics services. As HOMIE is serving customers all around the Netherlands, it is hard for the company to deliver the appliances far away. EL helps HOMIE in these long-distance delivery and installation services. Meanwhile, EL provides goods replacement service (long-distance). Together with EL, HOMIE can ensure the on-demand supply of goods and the timely realization of services.

Manufacturer

Currently, HOMIE is using the products and repair service from Zanussi. However, HOMIE does not have any specific collaboration from Zanussi. In order to realize its mission of promoting a more sustainable white goods industry, HOMIE is talking to manufacturers such as Bosch, Electrolux, and manufacturers from Turkey and China about optimizing the constructions or components of the appliances. In the future, HOMIE plans to persuade manufacturers to produce machines with HOMIE's label.

> *"We are in discussion with manufacturers. 'Ok are you able, or willing to manufacture this and this type of machines? It's almost your machine but we want to skip that, and skip that, that, that.' So there may be variation on these models. Something like this is a possibility. And maybe our brand name on it. So with our label, and we call it the HOMIE machine."*
>
> —— *Paul Dekker, Partnership Manager at HOMIE*

The trackers are currently being produced in China and transported to the Netherlands. But as HOMIE is looking for an alternative way for accessing data from different machines, this collaboration may change in the future.

ICT team

HOMIE is collecting and analyzing customer data and using it as a way to promote sustainable consuming behaviours. It is essential to engage the service via a platform and optimize the way of data collection and communication. Furthermore, HOMIE plans to involve more kinds of appliances in its pay-per-use model, which will be a big challenge towards its present technology. Therefore, HOMIE is spending a lot of time, technicians and money on ICT for the sake of future development.

> *"We have a lot of development in ICT, a lot. A large amount of investment will go into ICT"*
>
> —— *Paul Dekker, Partnership Manager at HOMIE*

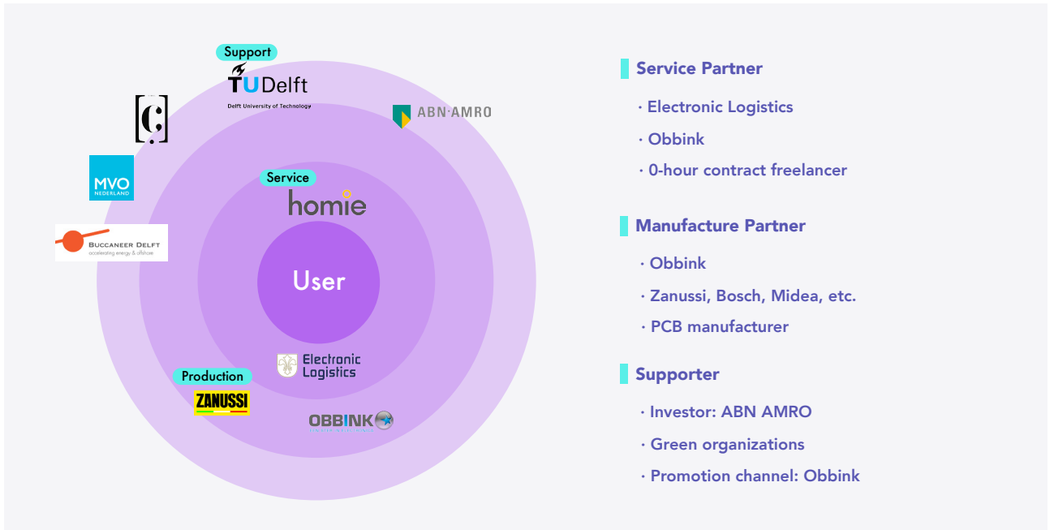


Figure 9. overview of the current HOMIE stakeholder map

Avalex

Collecting old devices for its customers is part of HOMIE service. The collected old machines will be recycled by Avalex. Currently, HOMIE does not charge customers for this service. However, HOMIE does not have any specific partnership with Avalex yet.

> *"We have to take old machines back, so you just have to do it, because of the law. Then we store them somewhere over there. And if we have 6 picked-up or old machines, we call Recycle and they pick the machines up and recycle it for us."*
>
> —— *Beau Benerink, Marketing & Communication Expert at HOMIE*

Other stakeholders

HOMIE stays active in sustainable organizations such as CIRCL, MVO Nederland, Water Work, and Buccaneer Delft. In these organizations, HOMIE joins activities, doing lectures and joining exhibitions.

The collaboration with side product companies(for instance, detergent companies) are also under the consideration of HOMIE's future plan. But this collaboration is pushed back as HOMIE is spending most of the time and energy in ICT. Meanwhile, ABN AMRO has been an investor (financing partner) of HOMIE since 2018(TU Delft, 2018) .

An overview of HOMIE's current stakeholders is shown in *Figure 9*. The collaborated service process is plotted in *Figure 10*.

Company Analysis

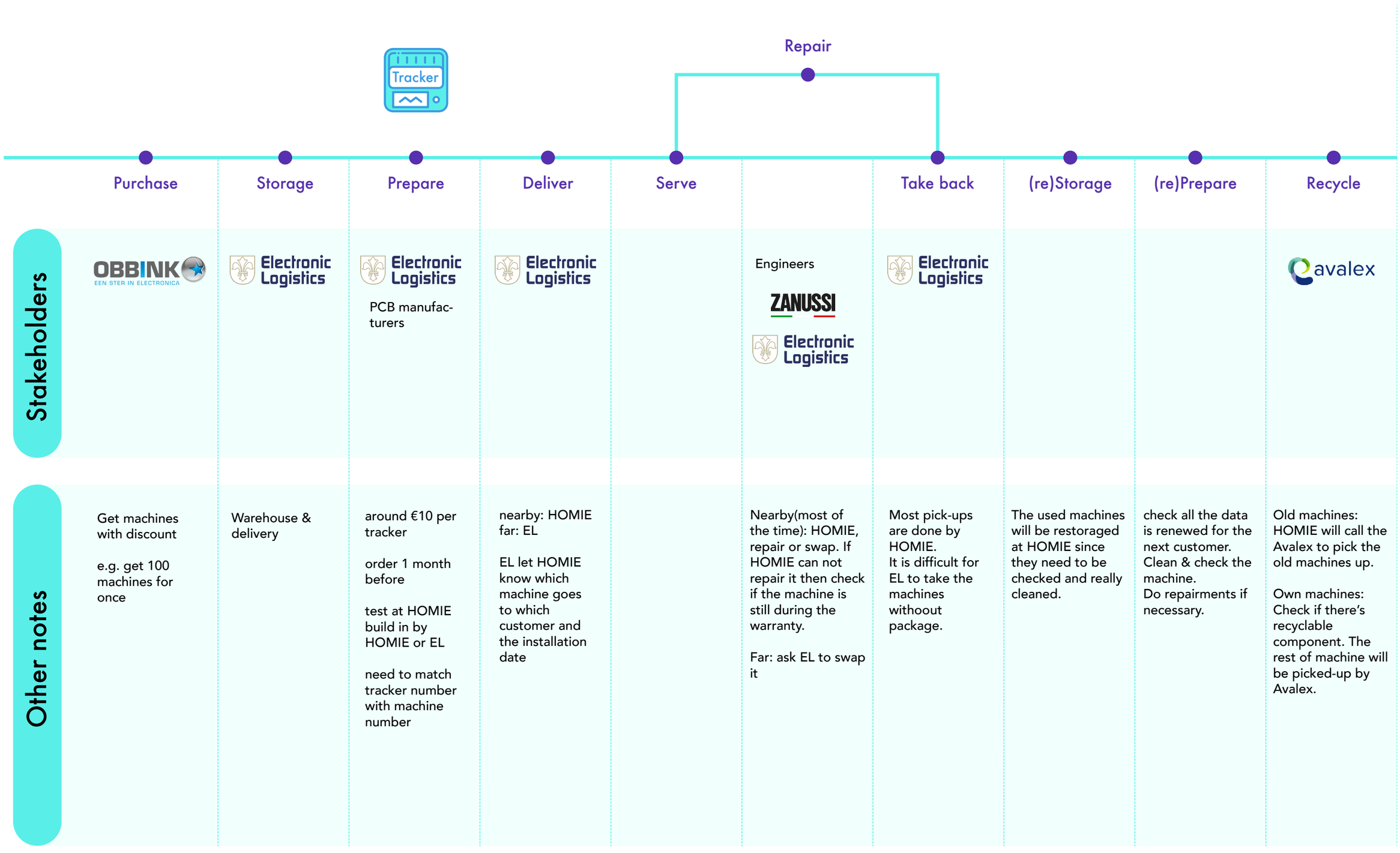


Figure 10. the current HOMIE service operation stakeholder map

3.5 Map Business Model Canvas

The Business Model Canvas (*Figure 11*) shows an overview of previous company analysis.

HOMIE offers pure pay-per-use service that is affordable and worry-free for its customers. Currently, HOMIE mainly target on customers who are mostly motivated by the flexibility, sustainability and affordability of the service. HOMIE build up customer relationships by efficient customer service and regular feedback(e.g. Invoice emails after each use cycle, monthly emails with usage data, online surveys, etc.). As a PSS company, HOMIE partners with white goods dealers and logistics companies to operate its pay-per-use service model, which costs a lot. The cost structure shows that HOMIE has to pay for its bills to a lot of stakeholders. However, HOMIE's current revenues only come from two channels, customer payment and the funding from investors. The pure pay-per-use model means that HOMIE has a long pay-back period with customer payment, which limits HOMIE's speed of scaling up. Therefore, the future HOMIE pay-per-use service model needs to involve the strategy about how HOMIE can attract a bigger group of customers and find more revenue streams, thereby enabling HOMIE to promote sustainability among more dryer users.

Key Partners

- Obbink
- Electronic logistics
- ABN AMRO
- Circular-related organizations

Key Activities

- Data collection
- Service
- Feedback: usage data & monthly emails

Key Resources

- Employees
- Products + trackers
- Social media
- Customer feedback

Value Proposition

- Affordability
- Worry-free (service)
- Eco-aware
- Customer Empowerment
- Flexibility

Customer Relationships

- Invoice emails and Monthly emails
- Online survey
- Customer webpage
- Contract

Channels

- Word-of-mouth
- Google advertisement (browser)
- Social media
- Obbink stores

Customer Segments

- Short-staying roamers/ expats
- Price sensitive customers
- Green consumers

Cost Structure

- Workspace
- Employee salary
- Machines (purchase + maintenance)
- Tracker (purchase + maintenance)
- Transport (Purchase service from EL)

Revenue Streams

- Customer payment
- Funding

Figure 11. current Business Model Canvas of HOMIE

Company Analysis

3.6 Competitor Analysis

The current competitors of HOMIE are distinguished into different circles (*Figure 12*).

As a pure pay-per-use business that currently only charges the customer when the machine gets used, HOMIE has already ahead of its competitors in this segment. However, in the competition circle of PSS dryers, HOMIE has a lot of competitors such as Bundles, Splash, CoolBlue, WASGOED, Skala, Meo Lease, and the manufacturers who are also implementing PSS models such as WeWash from Bosch. In the competition circle of all products fulfilling the need for laundry drying, competitors such as shared laundry dryers, laundry drying stores, and physical drying can also be a threat. *Figure 13* shows the basic offers of these competitors.

These competitors do have advantages compared to HOMIE. Some get support from manufacturers (e.g. Bundles supported by Miele; WeWash supported by Bosch), some have connections with customers via smartphones (e.g. WebApp from Bundles), some have a larger customer group(e. g. WeWash has over 25000 users), and they all provide good service. However, most of them are more expensive than HOMIE and their contract periods are less flexible. Therefore, HOMIE needs to keep its advantages and look for more communication channels as well as continue developing its customer group.

1. form competition circle: pay-per-use dryers
2. category competition circle: PSS dryers
3. generic competition circle: all products fulfills the same need

Figure 12. The competitor wheel of HOMIE

Name	Land	Price	Flexibility	Targets	Machine Quality	Addition Service	Other Notes
Bundles	NL	Monthly leasing + PPU	Cancel every month (but have an €89 deposit as moving fee)	B2C	High (Miele)	- Free maintenance - Free installation - Free to take old devices	- The deposit will be returned if the subscription period > 5 years - WebApp - Concern environment
Coolblue	NL Belgium	Monthly leasing + deposit	One year contract at least	B2C B2B	Various brands	- Free maintenance - Free installation - Free to take old devices - Personal advices & free try at store	- Service advanced - Has a lot of other appliances - Physical stores
Splash	NL	Monthly leasing (first 2 months free)	One year contract at least	B2C (Students)	Various brands	- Free maintenance - Free installation - Free to take old devices	Concern environment(only eco-friendly equipment)
Wasgoed	NL	Monthly leasing	One year contract at least	B2C (Students)	High	- Free maintenance - Free installation - Free to take old devices	-
WeWash	DE	Purchase WeWash Box Cost with a flat-rate of 20% charge on revenues on the prices set by the customer	Return risk-free within 4 months	B2B	High(Bosch)	- Free maintenance - Free installation - Free online paying systems support	- Pure B2B (for common laundry rooms) - App - Free support even on Sundays and holidays - Help care about and support tenants(end users) - Adapt to both old and new machines - Intergrated GSM module (no internet connection required) - Available machines need to wait
MEO Lease	NL	Monthly leasing (contract fee: €20 for 1 year, €10 for 2 years, €0 for 3 years and more)	One year contract at least	B2B & B2C Students Individuals Companies	Various brands	- Free maintenance - Free installation - Free to take old devices	-
Skala	NL	Monthly leasing	5 years, 7 years, 10 years contract	-	Big brands	- Free maintenance - Free installation	- Will check consumer's finance status

Figure 13. Key competitors analysis

3.7 SWOT

The goal of the new service strategy is not only to promote sustainable customer behaviours but also to generate business value for the company. Therefore, to find out the opportunity for new concepts, SWOT analysis of HOMIE is conducted(*Figure 14*).

Strength

- HOMIE has an attractive customer strategy: With a clear brand positioning, HOMIE can attract its target customers such as roamers, environment-conscious customers and cost-sensitive customers. With a well-designed experiment strategy (Bocken et al., 2016), HOMIE collects customer feedback and communicates with customers efficiently.

- Early in the market (trend leader): By offering pure pay-per-use models and promoting sustainable consumption behaviour by various pricing models, HOMIE has ahead of its competitors in this market segment.

- Supportive and efficient customer service: HOMIE provides a supportive and efficient customer service that is fast, clear, and convenient. The service has built up a good brand image among its customers.

- Good customer relationship: On Trustpilot, HOMIE got 4.9 and received positive comments from its customers. By keeping a good relationship with its customers, HOMIE can raise brand loyalty and benefit from word of mouth.

- Competitive pricing strategy: Compared to its competitors, HOMIE offers pay-per-use service at reasonable prices. This helps HOMIE to attract cost-conscious customers.

- Easy access for the service: HOMIE provides a flexible contract which encourages customers to join this service. Besides, fast delivery, quick installation, clear instructions and frequent feedback bring customers the confidence to operate the service.

Weaknesses

- The small size of the customer group: HOMIE currently has over 1000 customers in total, but the size of its customer group is still not big enough. To generate more revenue, HOMIE needs to develop a bigger customer group.

- Limited communication channel with customers: Through invoice emails after each use, monthly email (to be applied soon) and supportive service, HOMIE manages to communicate with its customers frequently. However, to strengthen customers' capability such as asking for support and changing their behaviours actively, more communication channels need to be developed.

- Relatively short-period customer relationship: A big part of HOMIE's customers are roamers who can hardly stay at the same place for a long time (more than 2 years). Although HOMIE has built up a good customer relationship and developed a group of loyal customers, a part of its customers can only subscribe to the service for a limited period. Since HOMIE emphasizes the value of using appliances in the long-term, the company needs to attract customers who can use the service for a long period (more than 2 years).

- Rare influence on product design: One of the ways of HOMIE's sustainable concept is to give opportunities for OEMs to produce higher quality equipment with longer service life. However, HOMIE does not have collaboration with manufacturers on the product design level yet. Meanwhile, most of the manufacturers pay little attention to user feedback as they mainly focus on business to business markets and produce components. Although there's a trend that more and more manufacturers start looking into customer feedback, it will still be hard to persuade them to build partnerships based on customer data.

- Long payback period: The pure pay-per-use service has a long payback period. HOMIE can hardly generate a big amount of revenue based on its current services in a short time.

- Cash flows may limit the speed of scaling up. Serving more customers means purchasing and maintaining more equipment. Meanwhile, HOMIE has to pay for the employment, workplace, ICT innovation and the cost of operating its service. However, HOMIE currently can only generate revenue from funding and customer payment. And due to the long payback period, HOMIE has limited cash flows that may limit the speed of scaling up.

- Same B2C and B2B service: Currently, HOMIE offers same services of its B2C and B2B business. Since the stakeholders, using scenarios, customer journeys of B2B models are different from B2C models, HOMIE needs to look for a more suitable service model for its B2B business.

- Customers' quality perception of Zanussi: Customers may have different views of the machines selected by HOMIE. Since HOMIE only offers Zanussi, customers have limited choice. It could be a risk if customers are not satisfied with the product itself and then blame on HOMIE.

Opportunities

- Increasing awareness of sustainability: There's a big trend that the awareness of sustainability in our society is increasing. HOMIE can make good use of its sustainable concept to attract more customers. It is a valuable opportunity for HOMIE to develop business value by strengthening its sustainable concept.

- Up-coming generation: The up-coming generation who are more conscious of sustainability are now living together with their parents. There's an opportunity for HOMIE to step in education-related services to help parents and surroundings discussing sustainability issues with the up-coming generation. Meanwhile, HOMIE can build up a good brand image among the up-coming generation. When this generation leaves their parents' homes and starts to live independently, they may form a huge market potential for HOMIE. In this way, HOMIE can attract more potential customers earlier than competitors. This may also help HOMIE to develop its customer group in the long-term.

- Cooperation with other key-players: HOMIE operates its services together with multiple partners. There is a chance to enhance collaboration by mutual benefit such as data sharing.

- Technology offers more channels on communication. Digital services and marketing on multiple channels offer HOMIE the opportunity of communicating with its customers more efficiently(Patel, 2020).

- The willingness to share data and the increasing value of customers in manufacturers. Users are more willing to share their usage data as well as feedback towards the product/service(Accenture, 2019). HOMIE thus has the possibility to collect data from their customer and look for partnership opportunities based on customer data.

- Services that related to better time management. People do not have enough time and have an increasing concern on the

Figure 14. SWOT analysis of HOMIE and its pay-per-use dryer model

bigger load of the dryer, which requires better service to help them manage their time in daily life(Technavio, 2016).

Threats

- The increasing demand for convenience and efficiency may lead to unsustainable drying habits. Being sustainable sometimes requires customers to take more effort. It could be risky to promote sustainable behaviours while harming customer satisfaction. Therefore, HOMIE needs to be extremely careful when implementing new eco-friendly solutions.

- Trends of "no consumption" and "drying on clothes-line". According to Alborzi et al. (2017), a group of Europeans choose to dry their clothes outdoors on a clothes-line, especially in summer. Under the influence of downshifting lifestyle and green pressure, people start looking at the advantage of "hang your laundry to dry"(for example, Boyles, 2019; Profita, 2019). Drying racks, as a cheap alternative to cloth dryers, are becoming increasingly popular. HOMIE may lose a group of customers who find out these alternatives to dryers. This trend can also threaten the cash flow of HOMIE. For instance, if a customer uses the HOMIE pay-per-use dryer only once a month, HOMIE can only earn up to 24 euros from this customer for a year.

- Being copied by competitors: HOMIE has a unique brand positioning and strategy. However, the service model can still be copied by the competitors who own more budget and aim to step into the pay-per-use dryer market. Therefore, HOMIE needs to keep developing its service model as well as enlarging its customer groups.

Overall, HOMIE needs to develop its strength(S) together with future opportunities(O), and meanwhile reduce its weaknesses(W) and threats(T). The directions could be cooperating key-partners to address the laundry drying needs between different customers, reducing laundry drying time and effort with new manners while keeping its convenience and sustainability, and develop customer groups among the up-coming generation. These directions will be further explained in *Chapter 6*.

Takeaways from this chapter

- HOMIE aims to achieve a sustainable household appliances industry by providing pay-per-use product-service models.
- The key value proposition of HOMIE is affordable, worry-free, high quality and gives people the experience to live a sustainable and quality life.
- Currently, HOMIE collects the dryer usage data in calculating the cost and providing feedback emails for its customers.
- HOMIE develops and operates its pay-per-use dryer service with multiple partners, including manufacturers, dealers, logistics companies and circular-related organizations. The new pay-per-use price strategy needs to consider the needs of these partners and generate new opportunities for collaboration.
- Compared with its competitors, HOMIE offers a more affordable and flexible service and has a good relationship with its customers, which are big advantages and should be kept in future service models. HOMIE needs to keep its advantages and look for more communication channels as well as continue developing its customer group.

Customer Analysis

Customer Analysis

As mentioned in previous chapters, the specific influencing factors in terms of sustainable pay-per-use dryer consumption behaviours are crucial for HOMIE to find out opportunities for developing its dryer service model. But these influencing factors are still not clear. Therefore, to better understand what customers need, whether and how variable price models affect their laundry drying behaviour, and how HOMIE can offer a better service, both qualitative and quantitative researches are required. This Chapter focuses on qualitative interviews to investigate the key drivers and barriers to sustainable dryer use behaviours.

Twelve interviews are conducted with both general dryer users and HOMIE pay-per-use dryer users with different household sizes to understand the Influencing factors of sustainable laundry drying behaviours, thereby figure out the challenges and opportunities of stimulating sustainable dryer use behaviours.

The main research question for the present study was *how can we offer a better pay-per-use dryer service for customers?*

The sub research questions were:

1. *What are users' laundry drying behaviours?*

2. *What are users' needs, concerns and pain points during the laundry drying process?*

3. *What do users think about sustainable laundry drying?*

4. *What can enable users to use the dryer more sustainably?*

4.1 Method

Eleven in-depth interviews and one text conversation were conducted with both general dryer users and HOMIE pay-per-use dryer users with different house sizes. To keep interaction focused but leave freedom for exploring richer data (Patton, 2002), I chose to do semi-structured interviews, where the main topics are about the laundry drying process of dryer users, their motivation and barriers of dryer use, and how they view sustainable dryer use.

4.1.1 Sampling

Twelve participants were selected by purposive sampling and grouped according to different household sizes: participants live alone(household size=1), participants live as a couple(household size=2), and participants live with a family (household size>=3). For each group, two types of participants were selected, of whom are HOMIE customers and the others are not. The information of the participants interviewed is shown in *Table 1*. The participant number was used for quote references in the findings section.
(Due to the language barrier, all participants are interviewed in English.)

	Participant number	Household size	Other notes
General dryer users (N=7)	P1-a	1	Shared laundry room user(pay-per-use)
	P1-b	1	Shared laundry room user
	P1-c	1	Private dryer user
	P2-a	2	Private dryer user
	P2-b	2	Private dryer user
	P2-c	2	Shared laundry room user(pay-per-use)
	P3-a	4	Private dryer user, have pets
HOMIE dryer users (N=5)	H1-a	1	-
	H2-a	2	-
	H2-b	2	Have pets
	H3-a	4	-
	H3-b	3	-

Table 1. Details of participants interviewed

4.1.2 Procedure & measures

The interviews were conducted in a semi-structured manner and usually lasted up to 20-30 minutes each. An interview guide was used to interview the participants(*Appendix 3*). Eleven interviews were conducted by phone and were recorded by a microphone plugged into a laptop, while one interview was conducted via text conversation. Participants were asked about their usual laundry drying process, motivations and difficulties regarding laundry drying, and their views on sustainable dryer use. Answers were recorded and taken as notes during the interview and then be transcripted and processed afterwards.

The interview transcripts were decided to be analyzed using thematic analysis approach as the similarities and differences of customer needs and opinions can be highlighted, and unanticipated insights can be generated(Braun and Clarke, 2006; King, 2004).

The analysis is conducted in three phases according to the guidelines inspired from Nowell, Norris, White, and Moules(2017), Phase 1- codes & small statements, Phase 2 - grouping small statements, Phase 3- clustering and discovering connections in the data.

Phase 1 - Codes & Small statements

A selection of quotes from all participants related to research questions was made based on a timeline and different opinions sections according to the interview guide. 85 initial statements are then identified accordingly (See *Appendix 4* for the complete list of statements).
Later on, a detailed customer laundry journey was generated, which shows initial statements in each action steps according to What - what do users want to achieve during each step, Why - what do users concern during each step, and How - what do users want to achieve during each step (*Figure 16*).

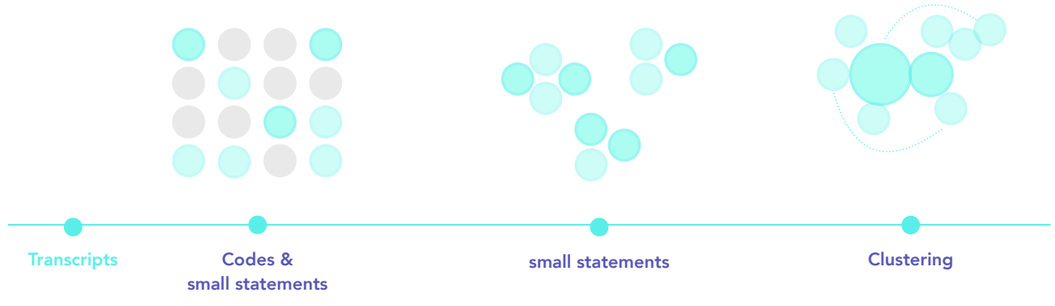


Figure 15. Data analysis phases

Customer Analysis

	Pre use			Use			After use	
Activity	Laundry collection	Laundry washing	Move the laundry and prepare for drying	Program selecting	Laundry drying	Move the laundry out of the dryer	Receive feedback	Top up money
What	● Get enough laundry to be washed ● Sort the laundry	● Get the laundry cleaned easily and efficiently ● Get the laundry ready to be dried	● Get the laundry prepared for drying ● Sort out the laundry that can not be dried in the dryer ● Make sure the dryer is ready to use	● Choose the best programs & dryness levels for laundry in a safe, easy and economical way	● Make sure the laundry actually get dried successfully	● Get the entire process finished.	● Check usage data, get information about their using behaviour and know how to improve	● Make sure the payments are/can be done.
Why	● make sure the laundry won't dye each other ● different types of laundry have different washing requests ● make sure to do an efficient wash	● Save time and effort ● Won't let the wet laundry wait in the washing machine for too long	● Make sure special clothes won't be damaged ● Some clothes can be air dried, so save money and energy ● Want the laundry to be dried efficiently	● Don't damage clothes ● Match other daily schedule ● Make sure the laundry is completely dried ● Hygiene ● Cheaper(price & energy) ● Get the clothes almost ready to be wear after the dryer is finished	● Afraid of the machine is not working and cost a waste of time ● Wanna see the machine is doing the cycle	● Is the laundry completely dry? ● Does the laundry feels clean? ● Do I have to move it out immediately? ● Wanna make sure the dryer is cleaned	● How much did I consumed(this time / last month)? ● How can I improve my behaviour? ● What are the tips to better dry my laundry? ● I'm already aware of my drying usage.	● How much did I consumed? ● Any other updates? ● Is it convenient enough?
How	● Sort types of clothes, towels, linens, pet's clothes and wash them seperately if necessary.	● Set a timer to arrange the time when it's finished. ● Set a reminder to move the laundry out in time.	● Sort out laundry with special fabrics ● Move the laundry out of the washer as soon as possible ● FLaten the clothes a little bit ● Clean dust box and water tray ● Add dryer balls ● Dry clothes in air rather than in the dryer	● Choose the program according to the label or tag on the clothes ● Choose longer time or higher temperature to make sure the clothes get completely dried ● Put an extra cycle if the laundry is not dried ● Choose the Eco mode when it's cheaper ● Tend to stick on a certain program because afraid of making mistake or waste money ● Choose higher temperature and shorter time to match daily schedule	● Wait till the program start	● Sort cloth that needs extra air dry ● Do another cycle if necessary ● The time of taking the laundry out varies ● Empty the dust box and water tray	● Check the account page on Homie's website. ● Browse the updates on Homie's website while checking usage data or topping up the account. ● Check the monthly email from time to time. ● View the usage data selectively	● Go to Homie's website and top up the money ● May look at the web and get some updates when top up the money
Frustrations	● When have kids, the clothes need to be washed and dried more frequently			● Clothes get shrinked or damaged ● Don't really understand how the ECO mode works and contribute to the environment ● No enough information related to the best seetings for different conditions(types of laundry, load, energy using, average time of different settings & conditions)	● Could be annoyed by the noise ● Sometimes the machine is not connected to the internet	● Sometimes find out the laundry is still moist	● The monthly emails can be ignored ● It takes time and effort looking for tips ● The information may be not interesting enough and be forgotten afterwards	● It takes more steps than direct debit request
Opportunities	● Try to reduce washing frequency if there's not so much laundry,thus reduce the frequency of using the dryer		● Tips of sorting out special clothes ● Encourage to dry laundry together if have two cycles of washing ● Make use of the dryer balls (e.g. recommendation, bundles, gift)	● Recommenations on the best setting for different conditions ● More information about how the ECO mode works and contribute to the environment ● Lower price to encourage the use of the ECO mode ● Information of the average time of different programs & conditions ● Estimation of the energy consumption of different settings ● Tips of whether put different types of clothes into the dryer ● Clear instructions on different programmes and dryness levels	● Indication of the working status of the machine ● Indication of internet connection	● Recommendations on how to get the laundry completely dried.	● Enable the users to look for tips or informations easily (chatbot, search functions, etc.) ● Offer more personal tips	● Make use of the top up interface for showing updates

Figure 16. Customer Laundry Journey

Phase 2 - Grouping small statements

Later on, the small statements were grouped into small themes according to specific characteristics of the data. These themes were reviewed, iterated, and further grouped into reasons and behaviours. The reasons represent the customers' needs, concerns and difficulties. The behaviours represent the decisions and actions the customers would take/make. The list below shows these themes in groups with alphabetical order.

Phase 3 - Clustering and discovering connections in the data

After all the themes are generated, the reasons and behaviours were then matched and clustered to figure out the influencing factors of sustainable dryer use behaviours. The relationships between these themes are identified according to reasons-behaviours-results, where the results show whether the behaviours would lead to sustainable results or less sustainable consequences (Figure 17).

Reasons

1. Always have to check phones and emails
2. Caring about hygiene
3. Caring about convenience
4. Don't want to waste time & effort
5. Don't want to damage clothes
6. Don't understand how can using behaviours do for sustainability
7. Don't understand how programme works
8. ECO mode costing longer time
9. Financial concern
10. Getting the laundry completely dried
11. Getting the job done as soon as possible
12. Going through clothes quite quickly
13. Having kids
14. Having other schedules
15. Knowing the energy cost
16. Knowing the proper load to be sustainable
17. Lower price
18. No instructions/regulations about the proper load and the limit
19. Recommendations from installers
20. Taking time to figure out how does ECO mode work
21. Thinking it's the responsibility of manufacturers
22. Top up money on HOMIE's website

Behaviours

1. Check updates and tips from HOMIE
2. Choosing higher dryness level for heavy materials
3. Choosing less-sustainable programmes
4. Choosing the programmes with longer time
5. Choosing sustainable programmes
6. Consume less energy
7. Consuming more energy for drying
8. Do not think to change to sustainable behaviours
9. Do not try ECO mode
10. Filling less load when have heavy materials
11. Ignore monthly emails
12. Run another cycle if necessary
13. Stick with same programmes
14. Washing different colours of laundry separately
15. Washing pet's beds separately
16. Washing laundry more frequently
17. Using dryer more frequently

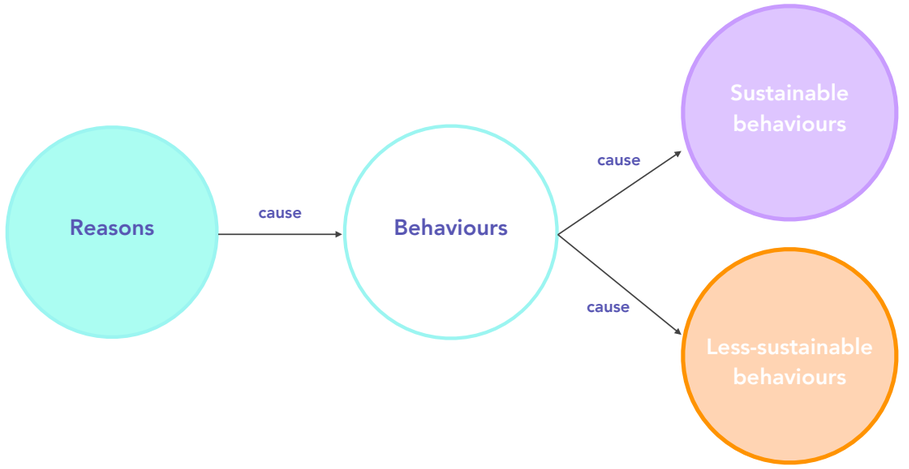


Figure 17. Relationship logic between themes

Inspired by the behaviour model mentioned in *Chapter 2.2*, the reasons-behaviours-results groups are clustered and visualized into three parts: *Motivation*, *Ability* and *Triggers* (*Figure 18*).

Motivation: What makes users willing/not willing to use the dryer sustainably?

Ability: What makes users able to/not able to use the dryer sustainably?

Triggers: What makes users act to use the dryer sustainably?

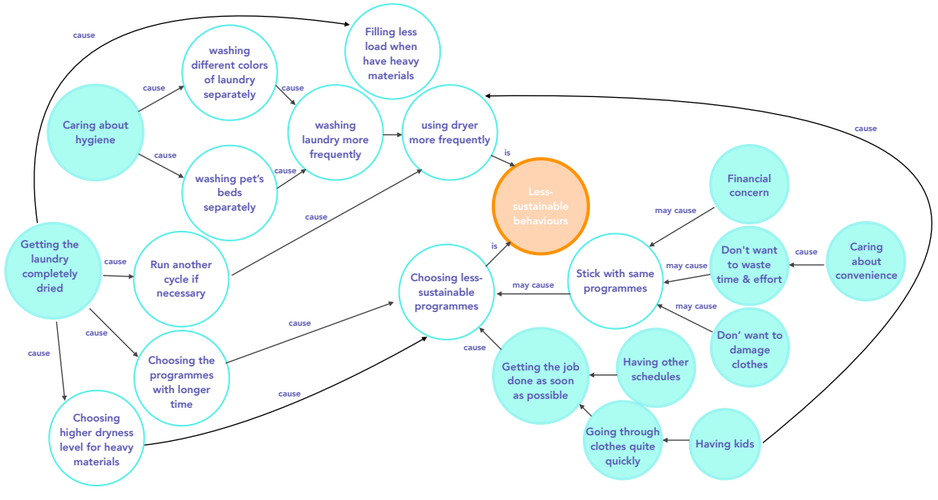
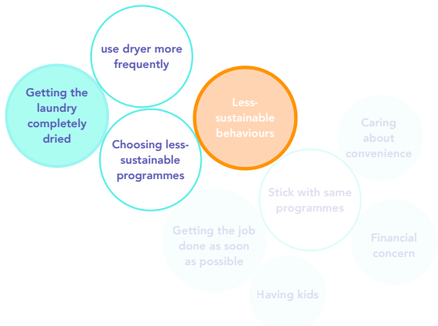


Figure 18. Clustered motivation-related themes. The complete 3 clusters can be found in Appendix 5.

The themes were then clustered into big themes and mapped back to the customer laundry journey to identify when these factors(themes) affect customer behaviours. Below(*Figure 19*) is an example of identifying the theme Getting the laundry completely dried, which has strong relationship with small themes Run another cycle if the laundry is still moist, Choosing the programmes with longer time, Choosing programs with higher dryness levels, and Filling less load when having heavy materials.



Getting the laundry completely dried

1. Run another cycle if the laundry are still moist
2. Choosing the programmes with longer time
3. Choosing programs with higher dryness levels
4. Filling less load when have heavy materials

> *...and when I do it I modify the dryness setting. I put it one notch up. So they are dried, like really dry when they come up.*
>
> —— H2-b

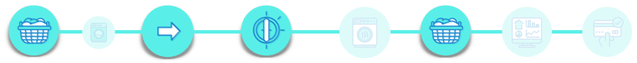


Figure 19. Identifying theme Getting the laundry completely dried

4.2 Results

4.2.1 Customer laundry journey

The customer laundry drying process is divided into several steps and mapped in a customer laundry journey map. The main behaviours, influencing factors and initial opportunities in each step are then investigated as shown in *Figure 16* and explained below.

Laundry collection

At the laundry collection step, users collect laundry that has to be cleaned and sort them by light/dark colour, types(coat, underwear, linens, towels, pet clothes, etc.) or materials. Then these different groups of laundry will be washed separately if the users find it is necessary. Different users have different criteria for separating the laundry for washing. Most of the time, if the users wash the laundry separately, the laundry will be dried separately as well. This is because users either choose to separate the washes on different days or don't want to leave the laundry wet for too long.

Laundry washing

At the laundry washing step, some users will set an alarm/timer to make sure they take the cleaned laundry out of the washing machine in time since they don't want the laundry to stay wet in the machine for too long. Other than that, users just wait for the laundry to be washed and there's no direct effect on their dryer use behaviours.

Move the laundry Prepare for drying

At the preparing for drying step, users take the cleaned laundry out of the washing machine, and sort out the laundry that can not be dried by the dryer. This is because users are afraid to damage their clothes made from special materials. Almost all participants said that they don't really measure the load of laundry because they think the load of the dryer is always bigger than the washing machine, and they find there's no need to make the measure. Before starting the dryer, most users will check if the dust box and water tray are empty. One participant mentioned that he will add dryer balls into the dryer to get the laundry to be dried in a shorter time. It is worth noting that users may choose to dry the laundry in the air rather than in the dryer when they want to save money or have more time, especially on sunny days.

Program selecting

The programme selecting step is critical to sustainable dryer use behaviours. Users chose different programmes or settings based on various needs and concerns. One of the things that users concern the most is getting the laundry completely dried since that's the main reason why they choose to use the dryer. Because of that, some users even choose the settings with the longest time; some users prefer higher dryness levels; some users would run another cycle if they found the laundry is still moist after one cycle. Although HOMIE offers a free month, most users prefer sticking to one or two settings they find the most "safe" and "works well" than trying various settings. This is because they are afraid of making mistakes and they don't want to damage their clothes or waste time on another cycle. However, most users are not really sure if their choice is the best. They choose the settings based on their experience since they don't have enough knowledge. Users lack the motivation to spend time on learning the best settings. ECO mode is not really popular for most participants because they want to save time and don't want to sacrifice their time for sustainability. Even for participants who do concern about environmental impact, there's a gap of knowledge about how the ECO mode contributes to the environment. The users who choose to use the ECO mode are mostly motivated by the lower price. There's one thing to note that one participant mentioned that he chose to use the ECO mode because he was convinced by the installers who said that the ECO mode is the best setting.

Laundry drying

At the laundry drying step, some users will wait till they see the machine really start to work. Since HOMIE's pay-per-use dryer is working with the internet, one participant mentioned that he is afraid that the dryer is not connected to the internet. Users feel troubled by the sense of uncertainty and wasting time and effort.

Move the laundry out of the dryer

After the dryer programme is done, users will take out the laundry and check if the laundry gets completely dried. When finding the laundry is still moist, some users will hang the moist laundry around; some users will put the laundry back into the machine and run another cycle. Users may change their choice of settings at the next time to make sure their laundry can get completely dried.

Receive feedback

HOMIE's customers will receive an invoice email with usage data after each cycle is finished, which most users will only take a glance at to check the price. As for the monthly email with detailed usage data, most users will choose to ignore since they are busy and get too many other emails. Even for the users who read through the monthly emails, it is hard for them to remember the content and change their choice accordingly when they use the machine the next time.

Top up money

Users top up their account on HOMIE's website and check their usage data. At this step, users will check updates or tips on the web page as well. There's an opportunity for HOMIE to make use of the account page for sharing sustainable dryer use related information.

There are various sustainable and unsustainable dryer use behaviours caused by different reasons along the laundry drying process, which lead to both challenges and opportunities of this design. Therefore, it is important to figure out the exact influencing factors of sustainable dryer use behaviours, to identify the main opportunities of developing HOMIE pay-per-use dryer service model. The findings of those influencing factors are shown below.

4.2.2 Influencing factors of sustainable dryer use behaviours

The analysis provided 12 big themes which are mapped into a current sustainable dryer use behaviour model (*Figure 20*). The model provided an overview of the current drivers and barriers for sustainable dryer use.

Figure 20. Current sustainable dryer use behaviour model

Each influencing factor is explained below.

1. Financial concern

Financial concern can be both a driver and a barrier to sustainable dryer use behaviours. Users prefer to use the ECO mode which is cheaper than other programmes with the same or higher dryness levels. However, because users don't want to waste money and are afraid of damaging clothes, they usually stick to the same setting and refuse to try other programmes. HOMIE needs to make good use of this motivation to attract customers and stimulate sustainable consumption behaviours.

> *"I'm not sure the differences with the others because I don't really want to try it and then it doesn't dry it and then I have to pay for it. Um, I prefer to stick with what is fine."*
>
> *---- H1-a*

"So I just use one option on the dryer also because all the options are the same price."

---- H2-b

2. Concern about sustainability

Most users care about sustainability or don't mind being sustainable, so they will use the ECO mode or use the dryer less frequently (e.g.try to fill the dryer with a full load). However, caring about sustainability is not the main motivation for using dryer sustainability. Users value other things more such as getting the laundry completely dried. HOMIE needs to raise the ability of users for sustainable dryer use, as the motivation and ability can trade-off for effective persuasion (Fogg, 2007).

"So yeah, I ensure that at least I have enough clothes that I'm washing and drying so that it makes sense."

---- H2-a

3. Getting the laundry completely dried

As one of the main goals of using a dryer, getting the laundry completely dried is the factor that users most care about. Motivated by this factor, users will prefer to choose the programmes with longer time or higher dryness levels, filling less load when they have heavy materials, and run another cycle if they find the laundry is still moist. Therefore, this factor becomes a big barrier to sustainable dryer use behaviours. HOMIE needs to provide enough guidelines to help users get the laundry dried while keeping sustainability.

"…and when I do it I modify the dryness setting. I put it one notch up. So they are dried, like really dry when they come up."

---- H2-b

4. Getting the job done as soon as possible

Users want to finish the laundry drying process as soon as possible because they have other schedules or they go through clothes quite quickly. So users may refuse to spend time on trying other programmes or reading the dryer use instructions carefully. Some users choose programmes with a shorter time rather than the ECO mode. Therefore, it is important for HOMIE to build up users' trust in sustainable settings in a short time and offer clear and simple instructions related to sustainable dryer use behaviours.

"So I will try to get the job done as soon as possible. Especially at late-night."

---- P1-a

"We haven't been using it(the Eco mode) because when we got home we watched for an hour and a half and then we dried them for what we thought was going to be two hours but it is always more. So that wasn't... we have to go to bed."

---- H2-b

5. Caring about convenience

As another main reason for using a dryer, convenience is a big influencing factor of sustainable dryer use behaviours. Users don't want to waste time and effort on figuring out the sustainable settings. So they are not willing to change their behaviour and stick with the same programmes. Therefore, on the one hand, HOMIE needs to keep the dryer use convenient when stimulating sustainable behaviours; on the other hand, HOMIE can make non-sustainable behaviours to be less-convenient.

"I kind of don't understand how the program works, sometimes...because there's some things that I still haven't understood about it, but I haven't really taken the time to study the manual carefully to understand all of it."

---- H2-b

6. Don't understand how programmes affect the environment

Users lack knowledge about how different programmes and settings work, especially how different settings affect the environment. Therefore, they have to take the time to figure out how the ECO mode works. And it is difficult for them to understand how their use behaviour contributes to sustainable development. HOMIE needs to provide enough information about the environmental impact of different settings to make users be confident to choose sustainable dryer settings.

"But now I just didn't know anything about the consequences. So I haven't got awareness of I should use the dryer in a sustainable way."

---- P1-b

"But what is the benefit of which setting so the consumer actually understands that Oh, yeah, which one to use.."

---- H2-a

7. Not clear about the best settings for different conditions

Users are not sure about whether the settings can dry the laundry properly. As a consequence, they choose to stick with the same setting which they find the setting works fine. This is also a big barrier of using the ECO mode. Users doubt if the ECO mode suits the types or amount of the laundry they want to get dried. In addition, users have no clue about the proper amount to the laundry for different settings and don't know how to measure the load. As a result, they doubt trying different amounts with various settings. Therefore, providing clear and reliable instructions of different load/time/type conditions is another challenge and opportunity for HOMIE.

"I hardly use the Eco mode because I think the Eco mode can be... I don't know, the Eco mode can only dry the clothes made of some... made of cotton, so I can hardly definitely dry the clothes."

---- P2-a

"I would be very interested if there is anything in regards of how the load should be. I mean, whether it should be completely full, whether it should be half or something like that, and what kind of impact that has. So I'm actually not aware of that."

---- H3-a

8. Little time to check phones and emails

Most users will ignore the monthly emails from HOMIE since they are busy and get too many emails, even when they find the monthly emails useful. Consequently, it is hard to let them be aware of the effect of their behaviours. Therefore, it is important for HOMIE to find more communication channels to enable the customer to access their usage data and tips easily.

"Also, if I received the email, you know, I always have to be checking my phone and my emails because sometimes they get a lot of emails. And this goes down."

---- H1-a

9. No real-time estimation of energy consumptions while choosing the programmes

One of the participants pointed out that there was no real-time energy consumption indication which can support her to make decisions. Showing the energy consumptions in a direct way can trigger the users to choose the settings that consume less energy. HOMIE can find a way to show this information real-time clearly.

"So maybe, you know, per setting the settings they have in the dryer, they can say like, on an average, you know, this setting consumes this much amount of energy because it takes this much time so they can use average rate for that time and create that kind of sensitivity around to the customers."

---- H2-a

10. No real-time tips along the using process
Users may forget the tips easily. They may also have difficulties in relating various tips to specific steps and decisions. HOMIE can offer relevant tips and instruction at different steps to trigger users to follow the recommendations.

> *"I have to tell you the truth. I looked once and I don't even remember what they showed me."*
>
> *---- H2-b*

11. No real-time price indication when choosing the programmes
Even though most users are sensitive to price, there was no real-time programme and energy price indication to trigger users to choose programmes and settings accordingly. It is an opportunity for HOMIE to show the price of different settings and the money cost of energy consumption, which can make users more sensitive about the cost, thereby triggering users to choose sustainable settings with lower price and less energy consumption.

> *"We do go for the ECO. That's one because it's cheaper.*
>
> *---- H3-a*

12. Recommendation from the installers (physical contact)
It is worth noting that the influence of installers is considerable. As the only physical contact between HOMIE and the users (despite the maintaining service), the recommendation from installers can win more trust than digital information. One participant mentioned that he chose the ECO mode because the installers that the ECO mode is the best. HOMIE can make use of this physical contact moment to build up the trust of sustainable settings in users' mind.

> *"Well, I trust the ECO mode because when I got the dryer, the two gentlemen installed it, they advised that the ECO mode is one of the best modes, and it can get a proper dry with it. And I used that for the first time and it was perfect."*
>
> *---- H1-a*

4.3 Discussion

Interviews with users with various household sizes show different needs and concerns along the laundry drying process. The analysis of interviews also demonstrated that there are a lot of barriers which push the users away from sustainable dryer use. These can be the challenges and opportunities for this project.

A significant difference between the users who live with families (household >=3) and other users is that they use the dryer more frequently than the users who live with smaller household sizes. This is mostly because the users who have kids usually go through the clothes quickly. They have to get the clothes cleaned and dried in a short time. As a consequence, these users need to use the dryer rather than drying the laundry in the air (i.e. They are more dependent on dryers than others). What's more, customers who have pets usually use the dryer more frequently than others since they need to do the laundry specifically for pets.

Lack of knowledge and non-real-time communication are two big barriers for customers to use dryer sustainably. Moreover, users are less motivated if getting the instructions cost time, money or effort. Users usually have no clue about how to manage their dryer use behaviours to balance convenience and sustainability. These influencing factors match what was mentioned in the literature such as "readily available user support"(Kobus et al., 2013).

Additionally, the variable price strategy may have a positive effect on promoting sustainable settings as financial concern is a critical influencing factor. Users are more active to try the ECO mode if they find the price is lower than in other settings. However, some users don't mind to spend a little bit more money on other settings because of the needs such as getting the laundry completely dried. Therefore, quantitative analysis of usage data under different price strategies is required.

Furthermore, some participants shared their own tips of sustainable dryer use experience, such as making use of dryer balls or hanging laundry for half an hour before putting laundry into the dryer. Therefore, it is also an opportunity for HOMIE to encourage experienced users to share their tips to inspire other users.

Because of the language barrier, this research is only conducted with users who can speak English, which can be a limitation of insights. Furthermore, as HOMIE started the pay-per-use dryer model from December 2019, user's behaviours during summer and autumn time are not possible to be collected. Therefore, the effect of seasons on sustainable dryer use is not in the scope of this research. Moreover, this research is conducted during the pandemic of Covid-19, which may change users' needs(for instance, the concern about hygiene and different dryer use frequency). Therefore, the findings may have biases.

Overall, qualitative research provides an in-depth understanding of the customer laundry drying process and the influencing factors of sustainable dryer use behaviours. As some influencing factors cause different results between various participants, a quantitative analysis of usage data is required. The process and results of quantitative research is presented in the next Chapter.

Takeaways from this chapter

- Customers can be motivated by financial and environmental concern to perform sustainable dryer use behaviours. However, their main concern is the function value of the dryer(i.e. getting the laundry dried efficiently). The design needs to ensure the convenience in user experiences while promoting sustainable dryer use behaviours.
- Currently, HOMIE's pay-per-use dryer customers lack the knowledge and real-time support in terms of sustainable dryer use experience, which is a big barrier for them to actually perform the behaviours.
- HOMIE needs to provide on-demand support to enable the user to make sustainable decisions and perform the desired behaviours.
- Family users(household size >= 3) are more dependent on using the dryer than single and couple users. It is worth to figure out whether family users have different priority regards to dryness levels and the use of ECO mode from other household sizes. Therefore, quantitative usage data analysis should take household size into account.
- 5 opportunities for stimulating sustainable dryer use behaviours are concluded: (1)Offer clear and useful instructions; (2)Create more channels for tips and feedback sharing; (3)Bonus stimulation for ECO mode; (4)Special offers to family users; (5)Provide additional products for sustainable dryer using. *Appendix 6* shows each opportunity along the customer journey.

Usage Data Analysis

Usage Data Analysis

This chapter focuses on analysing the usage data of HOMIE pay-per-use dryer customers to figure out the influence of different price strategies on sustainable dryer use behaviours. The analysis includes three variables as criteria: monthly use frequency, monthly average dryness levels, and monthly average ECO mode use percentage.

As mentioned in the previous chapter, customers can be motivated by financial concerns to achieve sustainable dryer use behaviours. However, this motivation can be less attractive to the customers who value other factors such as getting the laundry completely dried. Therefore, to better understand whether the pay-per-use model and a variable price strategy can have effects on customer sustainable dryer use behaviours, quantitative research on HOMIE dryer customers is required.

This research focuses on the two trail pay-per-use price strategies that HOMIE is operating: the Fixed Price Strategy, where the price for all programmes are the same (€ 1.99, the average price for all programmes), and the Variable Price Strategy, where lower dryness levels cost lower price (*Chapter 3.3*). The goal of these price strategies was to stimulate sustainable dryer use behaviours(as defined in *Chapter 2.2.2*) by:

- Decreasing dryer use frequency
- Reducing dryness levels
- Encouraging the use of the ECO mode

The research questions are:
Whether different pricing strategies(Fixed Price Model versus Variable Price Model) have effects on stimulating sustainable behaviour, and can this effect be considered significant after controlling the household sizes?

Thus, this research hypothesizes:

H1 *Consumers in a pay-per-use business model will reduce their dryer use frequency.*

H2 *Consumers underestimate the frequency they use the dryer.*

H3 *Consumers in a variable price model are more active to reduce their average dryness levels.*

H4 *Consumers in a variable price model are more active to use ECO mode.*

5.1 Method

5.1.1 Data Collection

When users ordered HOMIE pay-per-use dryers, they were asked in an order form(*Appendix.7*) about their frequency of using the dryer, their preferred dryness levels, and their household sizes. These order form answers provide the information of the expected dryer use frequency and average dryness levels of users before using the HOMIE pay-per-use dryer.

When the user started to use HOMIE pay-per-use dryer, all their usage data was collected by the built-in trackers and sent to HOMIE(as mentioned in *Chapter 3.3*). The usage data includes the time each dryer cycle was performed, the dryness levels of each use, and the programmes selected. Based on this data, I calculated the number of uses for each month(i.e. the frequency of use), the monthly average dryness levels, and monthly ECO mode use percentage.

5.1.2 Data Analysis

In order to check how the usage data develops over time, the data collected from the same participants for each month was analyzed by Repeated Measures ANCOVA approach. To test the effects of different pricing strategies on customer dryer use behaviours, 48 HOMIE customers from both the fixed price group and the variable price group were selected, of which the fixed price sample group included 21 HOMIE customers, while the variable price sample group included 27 HOMIE customers. *Table 2* shows the sample characteristics of both sample groups.

To test the hypotheses, usage data of the participants in *Expected*(self-reported data from order forms), free month(*Month0*), first pay-per-use month(*Month1*), and second pay-per-use month(*Month2*) were collected.

Expected: The data collected from participants through the order form questions, which were used as the data on how people expected to use dryers before becoming customers of HOMIE. This data only includes the expected dryer use frequency and expected dryness levels.

Month0: The first free month was used to track how often and at which dryness levels people would actually use the dryer as a "general" dryer user without paying per use.

Month1: The first paying month was used to track the usage data on how users' dryer use behaviours will be affected by the pay-per-use model.

Month2: The second paying month was used to track whether users will change their behaviour after they paid for their use for a month.

	Fixed Price Group	Various Price Group
Sample size	N=21	N=27
Household size	Household size = 1: 59.1%	Household size = 1: 59.3%
	Household size = 2: 23.8%	Household size = 2: 29.6%
	Household size >= 3: 19.1%	Household size >= 3: 11.1%

Table 2. Sample characteristics

	Expected data Expected	Free month Month 0	PPU month1 Month 1	PPU month2 Month 2
1. Frequency of use	√	√	√	√
2. Average dryness levels		√	√	√
3. Eco mode use percentage		√	√	√

Table 3. Overview of each sample month and the data used for this research

5.2 Results

Monthly frequency of use

The monthly frequency of use was analyzed to check **H1**: *Consumers in a pay-per-use business model will reduce their dryer use frequency* and **H2:** *Consumers underestimate the frequency they use the dryer*. By comparing the means of frequency between the fixed price group and the variable price group, a hypothesis that the fixed and variable price group differ significantly from each other all the time controlling for the influence of household sizes was also tested.

Mauchly's test indicated that the assumption of sphericity had been violated, $X^2(5) = 27.83$, $P<.001$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .70$).

The results show that there was a significant difference between the *Expected* versus *Month0* (P=0.006) and a significant difference between Month 0 versus *Month 1*(p<0.001), and a significant difference between *Month 2* versus *Month1*(p=0.032).

The frequency of use of *Month 0* had been raised to 12.29 cycles per month compared to the *Expected* frequency(8.50 cycles per month). However, the frequency of *Month 1* had been reduced to 8.71 cycles per month. And the frequency of *Month 2* had been reduced to 7.13 cycles per month.

Expected(8.50) > *Month 0*(12.29) P=0.006
Month 0(12.29) > *Month 1*(8.71) P=0.000
Month 1(8.71) > *Month 2*(7.13) P=0.032

As for the effect of different price strategies, there's no statistically significant interaction between different price strategies on the use frequency after controlling for the effect of household size, F(1,45)=0.083, P=0.774. This indicates that people within different price groups have no significant differences in the average frequency of use.

The covariate, household size, was significantly related to the frequency of use, F(1,45)=10.694, P=0.002. This indicates that the larger the household size is, the more dryer cycles will be performed per month(*Figure 22*).

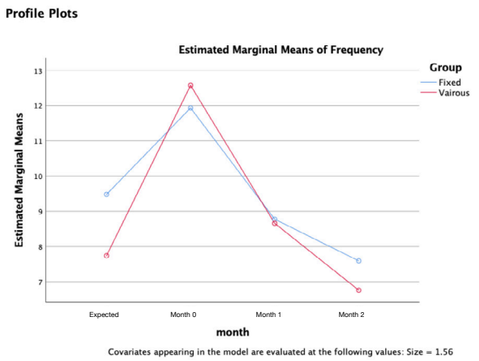


Figure 21. Average use frequency per month (n=48) for customers in the fixed price group(blue) and the variable price group(red).

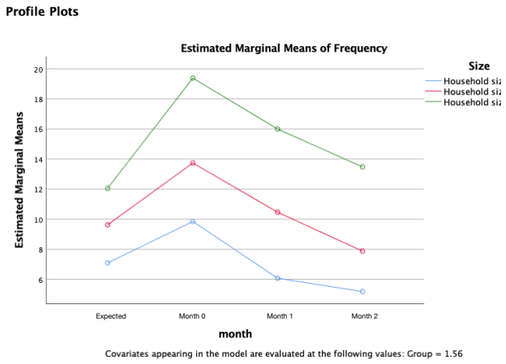


Figure 22. Average use frequency per month (n=48) for customers in the fixed price group(blue) and the variable price group(red).

Monthly average dryness levels

The monthly average dryness levels were analyzed to test **H3**: *Consumers in a variable price model are more active to reduce their average dryness levels.* To figure out whether this hypothesis is true, two sub-hypotheses were made as follows:

H3.1 *The monthly average dryness levels differ significantly from each other.*

H3.2 *The fixed and variable price group differ significantly from each other all the time controlling for the influence of household sizes.*

The results show that there was no significant effect of different months on average dryness level selection, F(2, 92)=0.579, P=0.563. These results suggested that the average dryness level the participants used is not significantly different for different months.

The results also showed that there was no significant difference between different price strategies on the average dryness levels after controlling for the effect of household size, F(1,45)=0.655, P=0.422.

The covariate, household size, was not significantly related to the average dryness levels, F(1,45)=0.460, P=0.501.

This suggested that the variable price model is not more effective than the fixed price model in reducing average dryness levels.

Additionally, the results showed that the average dryness level the participants used is around 2.47 (*Month 0*=2.45, *Month 1*=2.50, *Month 2*=2.45). This indicates that the average dryness level is relatively high(since the dryness level of the ECO mode and cupboard dry is 2). In other words, the design has the opportunity to decrease the use of unnecessary high dryness levels.

Monthly ECO mode use percentage

Finally, the analysis of monthly ECO mode use percentage was conducted to test **H4**: *Consumers in a variable price model are more active to use ECO mode*. Two sub-hypotheses were made for the analysis:

H4.1 *The monthly ECO mode use percentage differs significantly from each other.*

H4.2 *The fixed and variable price group differ significantly from each other all the time controlling for the influence of household sizes*

The results show that there was no significant effect of different months on the percentage of using the ECO mode, F(2, 90)=.918, P=0.403. These results suggested that the percentage of using the ECO mode is not significantly different for *Month 0*, *Month 1*, and *Month 2*.

Furthermore, there was no significant effect of different price groups on the mean percentage of ECO mode after controlling for the effect of household sizes, F(1,45)=0.001, P=0.971.

The covariate, household size, was not significantly related to the mean percentage of ECO mode, F(1,45)=0.603, P=0.441.

The results suggested that the variable price model is not more effective than the fixed price model in encouraging the use of ECO mode .

Furthermore, the results showed that the percentage of ECO mode use among the participants is around 26.2% (*Month 0*=22.7%, *Month 1*=23.8%, *Month 2*=32.0%). This indicates that the percentage of ECO mode use is relatively low. Therefore, the design should have a more positive effect on stimulating the use of ECO mode.

5.3 Conclusion

This research investigated the effects of pay-per-use price models on sustainable dryer use behaviours. The significant rise in dryer use frequency between *Expected* and *Month0* supports the assumption that customers underestimate the frequency they use the dryer. When the customer started to pay per use, the frequency of use appears a significant drop (between *Month0* and *Month1*), which indicates that customers in a pay-per-use business model will reduce their dryer use frequency. However, the use frequency, monthly average dryness levels, and monthly ECO mode use percentage of the variable price strategy group didn't show a significant difference from the fixed price strategy group, which suggested that the variable price model is not significantly effective at neither reducing average dryness levels nor encouraging ECO mode use compared to the fixed price model.

Furthermore, the average dryness levels are above 2.46, while the highest dryness level is 4(i.e. Extra dry) and the dryness level of ECO mode is 2(i.e. Cupboard dry). This indicates that HOMIE has the opportunity to encourage users to achieve an even lower average dryness level. Besides, the average ECO mode use percentage is around 26.2%, which shows that there's still room for HOMIE to encourage the use of this setting.

Overall, the pay-per-use model can be effective at changing customer dryer use behaviours by helping reduce the frequency of use, which supports the findings of prior research(Bocken et al.,2018). However, the current variable price model does not seem to create a significant change in ECO mode use and dryness level selection. These findings support what we investigated in the qualitative research, that besides financial concern, people have other motivations to their dryer use behaviours(*Chapter 4*). Therefore, the design needs to look for solutions for stimulating sustainable dryer use behaviours in other manners.

Discussion and limitations

HOMIE runs the fixed price scheme on its old customers, which means the participants in the fixed price group may already have been "trained" by the variable price strategy of HOMIE pay-per-use washing machine. This could lead to a bias in the analysis between the fixed price group and the variable price group.

Additionally, due to the length of this project, the research only analyzed a sample of 48 participants with their usage data in 3 months. Future research can look into the usage data in larger sample size and a longer period of time in order to investigate the influence of different seasons on dryer use behaviours.

What's more, the social distancing policy started in March 2020 and part of the usage data was collected from this social distancing period. Staying at home might have effects on customer dryer use behaviour. For instance, UNICEF(2020) suggested drying items completely to kill the virus, which may lead people to dry their laundry even more completely(i.e. choose higher dryness levels). As a consequence, the results of this analysis might be less accurate.

Takeaways from this chapter

- Paying for use has a positive effect on reducing dryer use frequency. However, a variable price strategy is not sufficient in reducing dryness levels and encouraging the use of ECO mode.
- The larger the household size is, the more frequent the dryer will be used.
- As current average dryness level is 2.47 and average use percentage of ECO mode is 26.2%, HOMIE has the opportunity to encourage a lower average dryness level and a higher percentage of ECO mode use by targeting other influencing factors.

Usage Data Analysis

Design Challenge

Design Challenge

From the research phases(*Discover* and *Define*), the main influencing factors of users to perform sustainable dryer experience were figured out. *Chapter 2* provided the influencing factors of sustainable behaviours from literature. *Chapter 3* investigated the resources, opportunities, weakness and threats of HOMIE， as well as which influencing factors HOMIE already targeted. *Chapter 4* and *Chapter 5* brought specific influencing factors of sustainable dryer use behaviours.

This chapter will define the problem by concluding the findings of the barriers in terms of sustainable dryer use behaviours and the reasons why these barriers exist. Then, the problem definition will be translated to a design vision as well as a design challenge which focuses on two perspectives: customer engagement and supportive communication. Finally, the design requirements of sustainable pay-per-use dryer service will be concluded from the perspectives of the customer, HOMIE, manufacturer and the environment.

6.1 Problem definition

According to the findings in qualitative interviews(*Chapter 4.2*) and quantitative usage data analysis(*Chapter 5.2*), the key problems in sustainable dryer use behaviours were identified.

Users don't see using the dryer is a difficult thing and are satisfied with their current situation. However, the lack of knowledge and support affect their behaviours, which leads to unsustainable results. Moreover, different users have different priorities in terms of the influencing factors of sustainable dryer use behaviours. The findings in quantitative research(*Chapter 5*) also shows that current HOMIE price models are not sufficient to promote sustainable dryer use behaviours.

To figure out the problems and opportunities in stimulating sustainable dryer use behaviours, the influencing factors identified from qualitative interviews and quantitative usage data analysis are explained with Fogg's behaviour model.

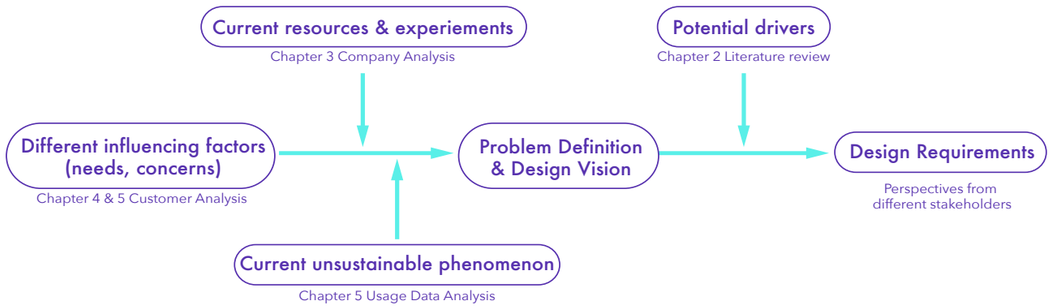


Figure 23. Process of problem definition

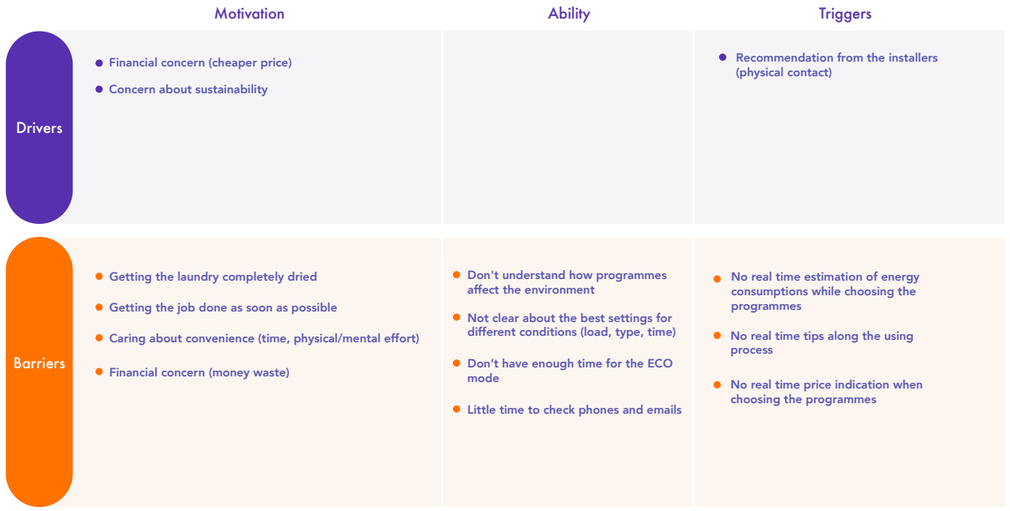


Figure 24. Current sustainable dryer use behaviour model

Barriers - motivation

Although users can be motivated by their financial concern to use the dryer less frequently, most of them are not motivated by a cheaper price to choose lower dryness levels or use the ECO mode. This is because the main goal for users of using the dryer is getting the laundry dried efficiently. Users prefer to choose higher dryness levels and programmes with shorter drying time. In addition, even if users gain self-satisfaction when being sustainable, they may not try sustainable settings when they want to save time or money. Users are afraid of damaging their clothes or wasting time/effort/money by trying new settings which are not clearly introduced. This serves as a negative motivator to try lower dryness levels or the ECO mode.

The users are not motivated to read the instructions carefully since they believe in their own experience or simply lack time. They are not motivated enough to check their usage data at the end of each month, either. This is because they are not clear about the reason for checking the instructions and usage data. In other words, users can't get information about what outcomes they can expect and how they contributed to the environment.

An opportunity to remove the barriers is by providing an optimized dryer use experience for users. Solving problems such as ensuring their laundry drying results, dispelling their fears, and enabling them to control the time and effort smartly might prevent users from choosing unsustainable behaviours. Additionally, as green pressure is becoming a trend, social comparison can be a positive motivation for the desired sustainable behaviours(which is also suggested in the literature from *Chapter 2*).

Barriers - ability

Even when users are motivated by the concern of sustainability, they may not be able to use the dryer sustainably. Users have no clue about the

proper load and the limit and have little knowledge of programmes. It becomes almost impossible for them to decide how to achieve sustainable dryer use. Meanwhile, users are not clear about the best settings for different conditions(i.e. special type of laundry, limited time, etc.). Managing the dryer use behaviours to balance convenience and sustainability becomes difficult.

Time acts as a big barrier to users' sustainable behaviours. Users will not use the ECO mode when they have limited time(for instance, they need to go to bed). Lack of time also hinders users from checking feedback emails, especially when they are not motivated to do that.

The opportunity of enabling users to achieve sustainable dryer use behaviours is offering clear and useful instructions that can be accessed by users easily. Real-time support and feedback should also be provided to prevent users from forgetting how to act.

Barriers - triggers

Currently, there are almost no triggers to sustainable dryer use behaviours during the experience. Users get no spark, facilitator, or signals when they make decisions. As a result, even if users have the motivations and ability to use the dryer in a sustainably, they may not perform the behaviour.

According to the research findings in *Chapter 4*, users have four decision moments: sorting the laundry, moving the laundry into the dryer, choosing the programme, and checking feedback. To make sure the users actually take the action to use the dryer in the desired way, triggers need to be presented at the right moment. This means that users should receive real-time signals, support, and feedback during the experience.

A key problem here is that users are mainly receiving feedback from HOMIE after the operating process passively. And users get no guide or indication related to sustainable decisions during the using phase (*Chapter 4*). Even for the users who check the usage data after use, it is hard for them to recall the memory at the next use.

Therefore, tips and feedback need to be offered in more channels in real-time, and enable users to proactively check information more flexibly, thereby trigger them to perform the desired behaviours. The triggers need to:

- Appear and work at the right decision time.
- Trigger users to think about making sustainable decisions;
- Highly related to users' specific needs;
- Be supported with high ability to make sure the users can take the action easily.

Overall, users want to dry their laundry efficiently, but they don't have enough time and support. The in-depth need for these users is to live a pleasant life while spending less time and effort. Therefore, the main target of this project is young urban professionals who are aware of sustainbility, want a higher quality of life, but busy with daily work. The main problem is defined as:

People who want to live a pleasant life are busy from daily work but still want to improve their living quality and contribute to the environment.

The design goal is:

To design a pay-per-use dryer service which is supportive, convenient, worry-free and can help people live a sustainable and pleasant life.

6.2 Design Challenge

Based on the problem defined, two perspectives of the challenge are framed: enhancing customer engagement and providing supportive communication. Enhancing customer engagement aims to enhance the motivation of customers to accept and participate in getting sustainable dryer use knowledge and perform desired behaviours accordingly. Providing supportive communication mainly target on offering support and triggers in sustainable dryer use experience. The opportunities based on each perspective are:

Enhancing customer engagement:

- Improve the satisfaction during dryer use experience
- Provide clear and personal tips and information
- Make it as easy as possible to operate
- Make use of the social comparison (family/ friends/other customers/general dryer users)

Providing supportive communication:

- Ensure the efficient use of the dryer. The functions on the dryer need to be explored and understood by users.
- Stimulate sustainable consumption behaviours. The communication needs to be sustainable-oriented and ensure convenient user experience.

The design vision is:

With HOMIE, everyone can organize their housework efficiently and confidently to live a sustainable and pleasant life.

6.3 List of requirements

Based on the previous research on customer, company, sustainability in this project, the requirements of different stakeholders are presented below. The requirements will be used for designing and figuring out how to further promote sustainable dryer use behaviours in a service system.

Environmental

- Decreasing dryer use frequency: avoid unnecessarily use
- Decreasing dryness levels: avoid unnecessary high dryness level settings
- Keep a longer relationship with customers

Business

- The concept should be feasible for HOMIE to implement the new concept by making use of its resources
- The concept should fit HOMIE's current value propositions: affordability, worry-free, eco-aware, customer empowerment, flexibility, and explore new value propositions if necessary
- The concept should increase users' engagement within the entire experience
- The concept brings business value or revenue stream for HOMIE
- The concept differentiates HOMIE from other competitors

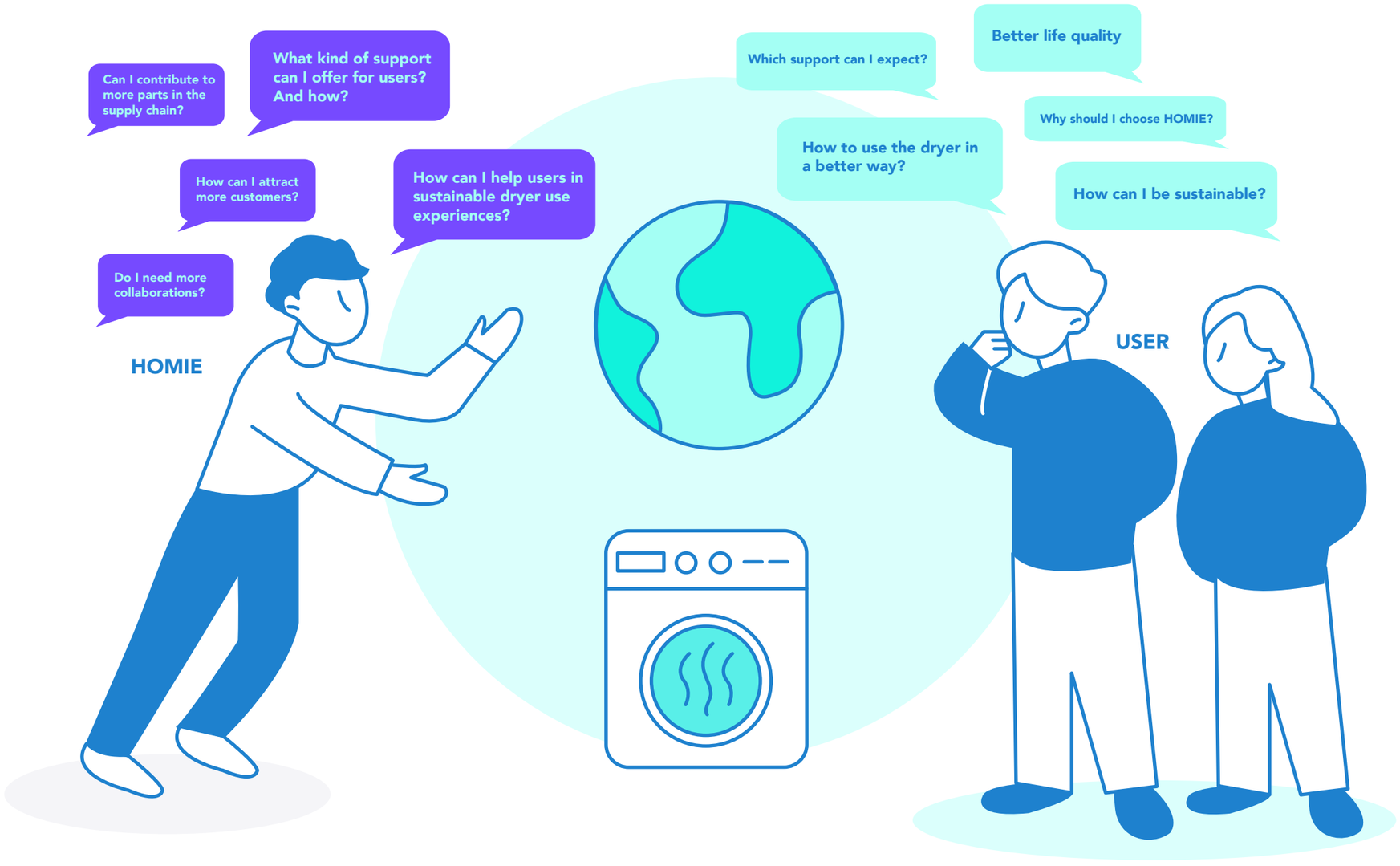
Users/customers

- The concept should enhance the convenience of the dryer use process by saving time and/or effort
- The concept should ensure users achieve effective laundry drying results
- The concept provides clear and practical

Problem Definition

instructions, tips and feedback for users

- The concept ensures users to access information easily
- The concept emphasizes sustainable behaviours and envisions the positive impact on daily life
- The concept should let the user aware of their role in sustainable dryer use
- The concept should let the user aware of their achievements to sustainability
- The concept should build up unique relationships with customers
- The concept should let customers feel empowered when using the dryer



Idea Generation

Idea Generation

This Chapter will present the conceptualization and ideation process. First, a creative session was conducted for generating ideas from different perspectives. Then, based on the creative session, problem definition, and research findings in *Chapter 2-5*, four concepts were generated. Finally, all concepts were evaluated according to the design requirements defined in *Chapter 6*.

7.1 Creative Sessions

A 1.5-hour creative session was conducted online via software Miro and Zoom with 5 IDE students to generate inspirational ideas that match the design goal. The session invited design students from IPD, DFI and SPD to ensure insights from more perspectives.

4 key design challenges are proposed in the sessions:

1. How can we enable the users to perform sustainable dryer use behaviours?
2. How can we motivate and trigger the users to perform sustainable dryer use behaviours?
3. What kind of communication channels can we explore?
4. How can we bring business value for HOMIE by offering the new service?

7.1.1 Procedure

Participants are then facilitated by the plan of the session shown below:

Agenda

Project Introduction(10min)
Current stage(company, user, market), customer journey map, highlighted influencing factors along the journey

Get inspired by the research findings(5min)
Sharing the motivations, abilities, and triggers gathered in the research. Take three interesting moments individually to help generate ideas for a service system.

Individual ideation(25min)
Individual ideate potential supporting systems directions. Then think about the connections between ideas. Try to explore other stakeholders.

Group Ideation 1(15min)
Brainstorm and share ideas and opinions. Make clusters and draw the envisioned connections.

Group Ideation 2(15min)
Generate an improved version of the systems as a complete overview. Map the ideas into a customer journey.

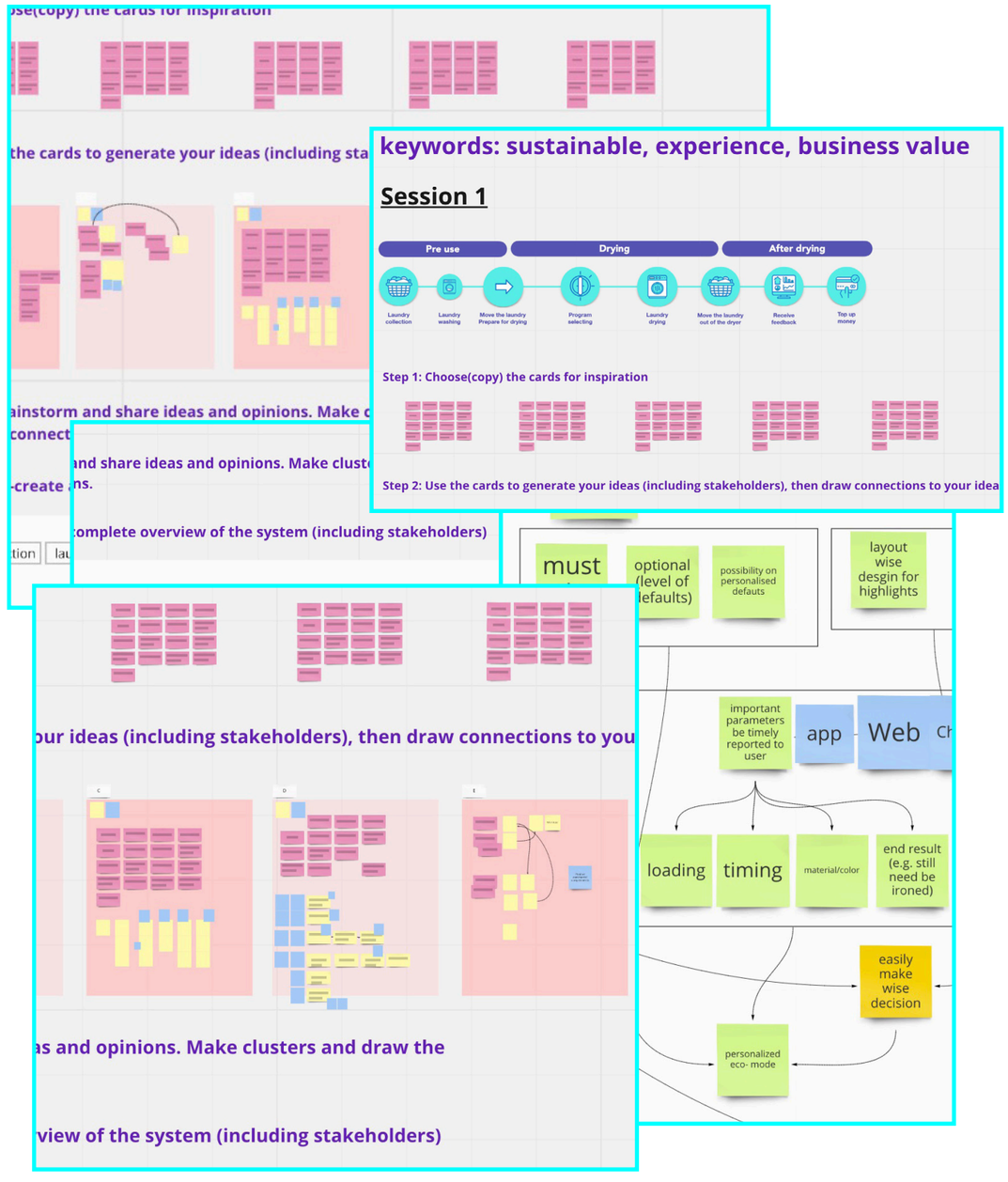


Figure 25. Some screen shots of the online session

7.1.2 Ideas

Pre settings and default settings
Ideas:
- Reduce the number of choices so that users don't have to spend too much time and effort to figure out how different settings work.
- Offer a "drying package" to encourage users to choose desired programmes and control their frequency of use.
- Ser the ECO mode to the default setting.

Remotely control
Ideas:
- Offer real-time notification via phone.
- Develop an app as a guide/assistant.

Personalized settings
Ideas:
- The sustainable settings should be personalized by users based on their own needs;
- Personalized data calculator.
- Customized combination of mode and drying time.

Specific support and recommendations
Ideas:
- Suggested drying mode based on the weather: e.g. on sunny days, recommend 80%-dry mode and dry completely under sunlight
- Showing time, saved money, and benefits to help users make decisions
- Programme recommendation based on different needs: materials, time, money, dryness level, etc.

Vivid ways to communicate
Ideas:
- Layout wise design for highlights;
- Label and visual indication for different settings;
- Use metaphors to show the drying procedure;
- Compare the difference between ECO and non-ECO in energy consumption;
- Illustration on the machine/Storytelling way;
- Use green/ yellow/ red light to indicate energy consumption levels of different settings;

Bonus system
Ideas:
- "Time as money"/Bonus back/Get discount by ECO use
- Award the family user with a gift to children
- Award the users when they contribute to a certain level.

Positive confirmation
Ideas:
- Show that customer are doing good things instead of waste
- Show the load instead of using time in the monthly emails
- Show how much the user saved(energy, money)

Competition
Ideas:
- Show the sustainability ranking among users
- Social media, show off the green steps you take

Smart system
Ideas:
- Link laundry machine and drying machine
- Provide plan for drying when washing is finished
- Machine weigh the laundry and generate recommendations

Separate information levels
Ideas:
- Labelling within the dryer container;
- Beginners' booklet/video;
- Show basic information on machine interface;

7.1.3 Conclusion

Below is a conclusion of the ideas according to an impact-effort matrix(GroupMap, 2017). Ideas that are more efficient to sustainable behaviours and feeding the environmental and user design requirements(*Chapter 6.3*) are considered to have a higher impact; Ideas with more strategy are those fit more business requirements or are easy to implement. The initial concepts will be inspired by the ideas that have a higher impact on persuading customers to perform sustainable behaviours.

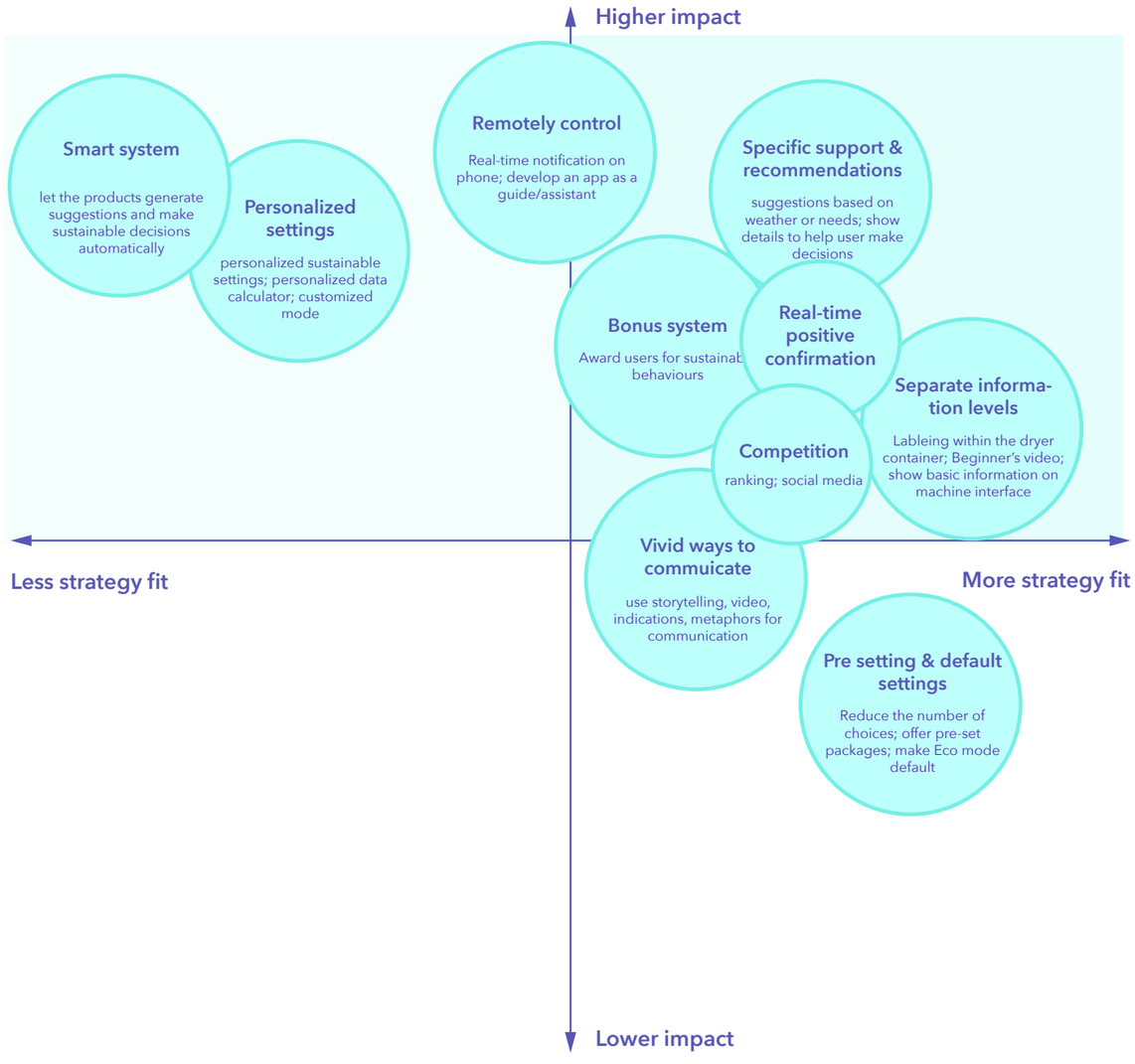


Figure 26. Ideas generated from the creative session

7.2 Concept development

Based on the creative session ideas, design vision and the research findings in previous chapters, four initial concepts for promoting sustainable dryer use behaviours are generated. The concepts aim to build up a product-service system, which involves the needs of customers(users), HOMIE, and other related stakeholders. These concepts target the design requirements from different perspectives. In order to explore more possibilities, these concepts have made some trade-offs in feasibility. In the next section, these concepts will be compared with each other by an evaluation session.

Concept 1 - HOMIE all in hand

This concept aims to take a mobile app as a new communication channel for HOMIE to provide sustainable-related support, share feedback, and build up longer-term customer relationships.

Why

Currently, HOMIE has limited communication channels (*Chapter 3.7*). As a result, users mostly receive instructions and feedback passively, which limits their ability to perform sustainable behaviours (*Chapter 6.1*). Therefore, it is important for HOMIE to explore more ways of communication in order to encourage its customers/users to perform sustainable dryer use behaviours in a more effective way.

An App is an efficient way to build up communication channels, which enables users to access information and service easily, sustainably(compared to printed instructions), flexibly and remotely. Vividus(2017) concluded that apps can encourage customer engagement, simplify communications, and provide secure, instant and direct information. Moreover, involving a mobile app in the service system is feasible as HOMIE is considering building up its app in the near future. However, competitors such as Bundles and CoolBlue, are operating mobile apps for providing service as well. To differentiate from competitors, it is crucial for HOMIE to think about the function patterns in the app. In other words, the key services provided by the app should be supportive and sustainable oriented, which matches HOMIE's key value propositions.

What

There are five key function patterns in this App:

1. Check real-time cost & usage

Knowing the real-time usage data and energy consumptions is a trigger for sustainable behaviours (*Chapter 4.1*). Qualitative interviews investigated that it is hard for users to access their usage data. Users have to go to their account page on HOMIE's website or check the monthly emails(to be applied soon). However, they usually don't have time to check the data, and the emails can easily "disappear" in other emails. Therefore, it is important to provide users with an easy way to check their usage data and sustainable impact.

The data checking service on the app should provide the basic information(when do they use the machine, which programme they chose, and how much energy they consumed). Users can check their usage history directly on the app instead of spending time on looking for monthly emails from a whole bunch of emails, which enables users to compare and check their monthly usage easily. With this service, users can be engaged with insights in their usage data and sustainable impact.

2. Tips & Guidance

A big barrier for customers to perform sustainable dryer use behaviours is the lack of knowledge about different settings and related energy consumptions(*Chapter 6.1*). Therefore, it becomes essentially important to offer supportive tips and guidance.

The tips and guidance should include a clear introduction of different programmes and dryness levels(their estimated duration, the fitted types of laundry, estimated energy consumptions, etc.), up-to-date tips such as how to deal with laundry drying in different weathers, and other recommendations such as the application of dryer balls(as pointed out by one of the customers in the interviews). Moreover, this service pattern should have a search function so that users can access the information they need efficiently. Users can quickly check tips when using the dryer or use their fragment time to look through these tips and guidance. With these supportive tips and guidance, users can be enabled to learn how to dry laundry efficiently and sustainably, which provides them with the ability to perform sustainable behaviours.

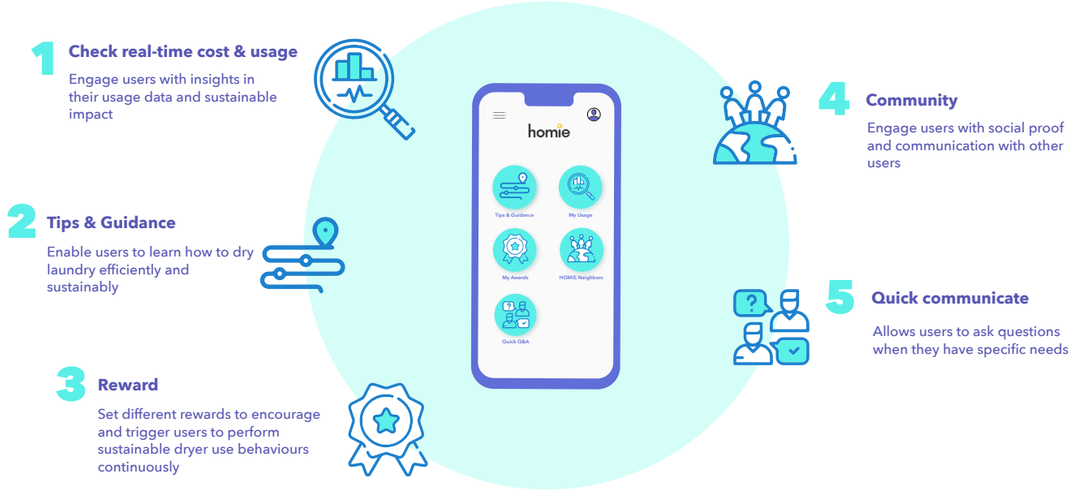


Figure 27. Key function patterns on the app

3. Reward

Rewarding and positive confirmation can motivate and trigger users to perform sustainable behaviours as they will feel their behaviour is observed and acknowledged(Lockton et al., 2010; Kobus et al., 2013). At present, HOMIE has not applied the reward strategy in its sustainable dryer use service. It is a big opportunity for HOMIE to involve rewards in the app.

Users can get various rewards by performing sustainable behaviours(for instance, use ECO mode for over 80% a month). According to the IIT Institute of Design(2010), people care about present gains more than future gains and get more pleasure out of multiple small gains rather than one larger gain. Therefore, instead of a big discount or bonus, HOMIE can provide separate small rewards for users to "unlock". For instance, giving different names of the rewards: "new to sustainability" badge, "the eco lover" badge, "the expert" badge, etc. By setting different rewards, HOMIE is able to encourage and trigger users to perform sustainable dryer use behaviours continuously.

4. Community - HOMIE Neighbours

Literature suggested that social communication and proof from peers can stimulate users to perform sustainable dryer use behaviours(Kobus et al., 2013). Besides the communication between

HOMIE itself and users, HOMIE can provide a communication channel that encourages information sharing between users. An online community is an ideal way to build up these connections.

Within the community, HOMIE can act as a facilitator who encourages users to share their sustainable dryer use experiences and achievements, ask for recommendations and receive sustainable behaviour related updates. By offering this service, HOMIE can collect data such as the most popular tips and the most shared needs to gain a more in-depth insight into what users think and concerns. Thus, the company can improve its supportive service(including laundry tips and program setting advice) and get opportunities in business and profits(KNOWARTH Technologies, 2017). In the future, HOMIE can also attract other stakeholders such as sustainable organizations, OEMs and industrial designers to join this community with user insights. These stakeholders can share their sustainable-related knowledge in this community. So this product-service system can make a more direct and effective change in the supply chain.

5. Quick communication

Although users can get familiar with operating the dryer and HOMIE app with little effort, there might remain small problems and requirements during the use process. Besides, perfecting an app is a long-term operation. To keep optimizing the service, HOMIE needs to get feedback from users on the reliability, readability, and supportability towards using experiences. A quick communication channel allows users to talk directly to HOMIE and highlight their problems as well as feedback.

Users can send an in-app message to HOMIE and get a quick and personal response. In this way, users have a higher ability to perform sustainable dryer use behaviours. Moreover, direct communication allows users to get personal tips and recommendations, which also helps HOMIE build a closer relationship with its users.

Concept 2 - HOMIE Planner

This concept aims to encourage and support users to plan their laundry drying when they have enough time to explore a new way to enhance the ability of users to perform sustainable dryer use behaviours.

Why

As investigated in *Chapter 4*, users have a lot of uncertainty during the current dryer use experience. Users usually finish washing and are triggered to use the dryer. Since this is a fluent process for users, they are seldom prepared to spend time and effort thinking about how to choose the settings carefully, let alone reading the instructions. When the dryer is working, it is hard for the user to check the working status(including the real-time dryness of the laundry, energy consumption, and estimated duration, etc.). The users can only see the estimated duration when they are standing by the dryer, which is not accessible when they are working on other things. After the dryer is finished, users receive almost no feedback or tips except invoice emails. And even if users received feedback, it would be a long time till the next use. It is still hard for users to recall the memory at the next use and make choices accordingly. Therefore, HOMIE needs to offer a better service to enable and trigger users to perform sustainable dryer use behaviours.

What

The HOMIE Planner aims to encourage users to pre-plan their laundry drying when they have enough time.

The key steps of this planner are shown below:

Step1: Prepare and Plan

The user will first prepare and plan their laundry drying by choosing the types of laundry they want to dry(to make sure the user doesn't have special materials to dry), the available time they plan to spend on the laundry, and results they want to achieve(e.g. For ironing, for putting into the cupboard, etc.). Then the user will receive

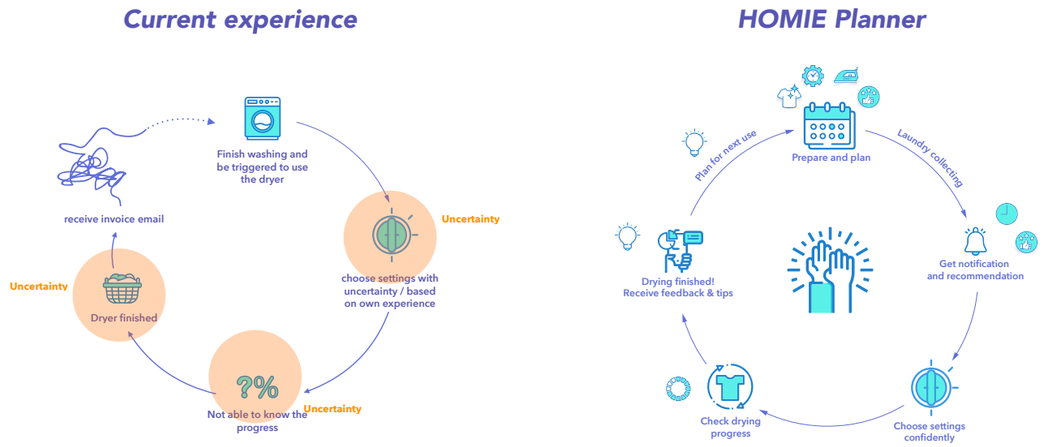


Figure 28. The user journeys of current experience VS. HOMIE Planner

recommendations of settings, estimated time, and estimated energy consumption so that users can decide when and how to do their laundry drying accordingly. After the user decides when to do the laundry, the user can set up a notification.

Step2: Receive Notification and choose settings based on recommendation

15 minutes before the planned time, the user will receive the notification together with recommendations. With this support, the user can choose the settings confidently.

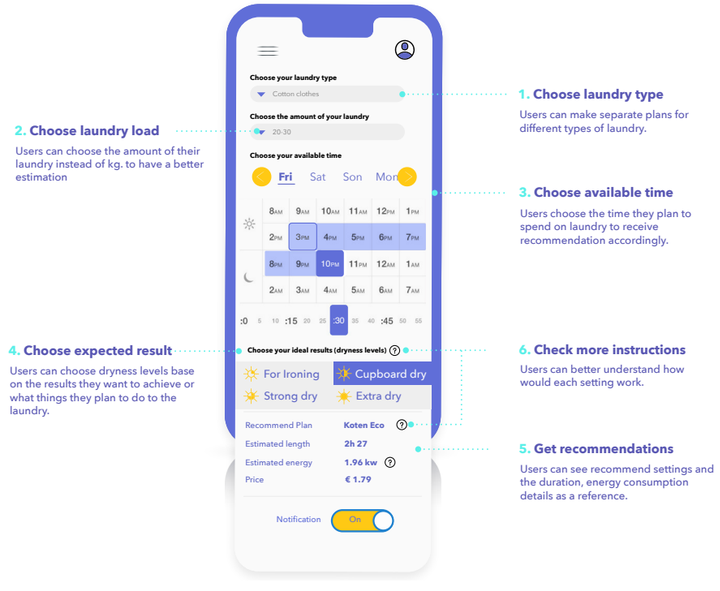


Figure 29. Example of the HOMIE Planner interface

Step3: Check drying process
With the Planner, users can also check the real-time drying status, which enhances the user's sense of control.

Step4: After use - check feedback and plan for next use
After the dryer is finished, the user will receive specific feedback(including actual energy consumption, actual time used, and actual cost) and tips related to the user's choice. The user can thus plan the next laundry drying base on these tips.

By using this service, users are able to have a well-planned laundry drying experience, thus having a better plan for daily life. The recommendations from HOMIE facilitate users to choose more sustainable settings and enable users to take more control in laundry drying. In addition, users can be well-triggered by real-time and specific feedback to perform sustainable dryer use behaviours.

Other benefits
HOMIE can have a better customer relationship and collect customer preference feedback and usage data（with privacy permission from the user). It is an opportunity for HOMIE to explore a new revenue stream by sharing customer feedback with OEMs. For instance, if most users prefer dryness level 3 or shorter drying time, HOMIE can persuade OEMs to optimize their products by developing ECO mode for dryness level 3 or shorten the drying time of programmes. Additionally, there is a potential for HOMIE to apply this service to shared houses and B2B service. For instance, the user can check when will the dryer be available and adjust their plan accordingly. Moreover, as IoT and smart homes become a strong trend(Marr, 2020), HOMIE can further develop and apply this service to other products and create a HOMIE smart home system in the future.

Concept 3 - HOMIE Smart Dryer

This concept is a future extension of HOMIE Planner and aim at the direction of smart sustainable-oriented product design.

Why
Smart homes and machine learning technologies grow rapidly in these years, which brings big opportunities in product-system design and business value. Fjord(2019) uses the example of the collaboration between IKEA and Winnow to propose that there's an opportunity for business to combine digital and physical product optimization. There's an opportunity for HOMIE to target smart appliances and service to offer up-to-date advice and customization, enhance efficiency, convenience, and comfort.

What
The user can see the HOMIE Smart Dryer as a personal assistant, who can help the user to plan and conduct laundry drying. As the laundry process includes laundry washing and laundry drying, both future smart washing machines and dryers are involved in this design.

Figure 30 shows the key user journey and related data flow.

1. Prepare
The user will first send pre-set requirements (including when would the user like to finish laundry, what results does the user want to achieve, etc.) to the washing machine and dryer. Then the user can collect laundry and put them into the washing machine.

2. Washing machine
The washing machine will then sense the type and load of the laundry automatically, and generate recommendations of settings and start time according to weather information and the user's requirements. Meanwhile, the washing machine will also send the laundry details to the dryer.

Figure 30. Data flow of HOMIE Smart Laundry

3. Dryer
Based on the received details and pre-set requirements, the dryer can generate recommendations including the setting, the length of drying and whether the user should sort out certain items, and send these back to the user. Based on these recommendations, the user is enabled to make the best decisions for effective and sustainable laundry. While the machines are working, the user can easily access and check real-time status.

During the entire experience, the user is empowered to take control of the process remotely and effortlessly. Another advantage of the smart home system is customization. The user can save preferred settings for different conditions. For instance, set timings for implementing the laundry choices and get recommendations for what laundry to sort.

These smart machines enable the user to have a better plan for their daily life. The real-time information exchange provides the user with a stronger sense of control in the laundry drying process. Real-time and specific feedback can make the user feel good to be sustainable. Moreover, the service also enables the user to customize settings based on the user's preference.

By offering these smart appliances, HOMIE can have a better customer relationship. HOMIE is also able to collect customer preference feedback and usage data and share customer feedback with OEMs. If the user sees the value of smart appliances, there is also an opportunity to promote other products in the HOMIE Smart Home system.

Concept 4 - HOMIE Free for Future

This concept is an extension of HOMIE all in Hand and mainly targets on new HOMIE customers. Users use the free month for trying out different settings with the support from HOMIE, to learn how to use the dryer most efficiently and sustainably.

Why

At present, HOMIE takes its free month strategy as a marketing tool to attract users. However, there are more opportunities for HOMIE to make better use of this free month. Currently, although users can use the dryer for free, most users prefer sticking to one or two settings they find the most "safe" and "works well" than trying variable settings since they don't have enough knowledge to make sure if their choice is the best and are afraid of making mistakes. Meanwhile, users lack the motivation to spend time on learning the best settings (*Chapter 4.1.2*). Therefore, HOMIE can use this free month experiment to encourage and enable users to learn how to use the dryer efficiently and sustainably.

What

This service provides an onboarding try out process to educate users to form a sustainable dryer use habit. *Figure 31* shows the customer journey to explain how this service works.

1. Order

The user orders HOMIE and sees the promotion of "Free for future" plan;

2. Invitation

The user gets an installation confirmation email which includes an invitation to join the "Free for future" plan. The invitation will explain how does this service work and invite the user to download the HOMIE App;

3. Register - First Eco Credit

The user downloads the HOMIE App and registers on the app. Then the user will get the first Eco credit which shows the user is already on step advanced than the general dryer users;

4. First try out - Second Eco Credit

After the installation, the user will start the free month. The user can try out different settings with the support(tips, introduction, guidance, etc.) on the app. These "support"s will be divided into small tasks for the user to finish. This is to avoid overwhelming amounts of information. For instance, the user can first look through the separated introduction of programmes related to specific needs, learn how to choose the settings, and then do the laundry accordingly. After the user finishes each cycle with support, the user can get one Eco credit. By trying out different settings with the support on App for multiple times, the user can learn well how to use the dryer wisely.

5. Keep trying out different settings

By trying out different settings with the support on App for multiple times, the user is able to learn well how to use the dryer wisely.

6. Free month end - Reward

At the end of the free month, users can collect enough credits and get a voucher to exchange for using a drying cycle for free. One free ECO drying cycle voucher can be exchanged by 10 credits since the average use frequency of HOMIE customers in the free month is around 12(9.86 for household size=1; 13.77 for household size =2; 19.29 for household size>=3).

7. Pay-per-use months - Share tips in community

In the pay-per-use months, the user can continue to collect credits by sharing tips in the HOMIE community. In this way, the user can be motivated by goal-setting and social proof to take care of their sustainable dryer use behaviours(Kobus et al., 2013).

8. HOMIE STAR

The most experienced and sustainable users who shared enough tips can become HOMIE STARs and share their stories of sustainable dryer use experience to inspire and attract other people.

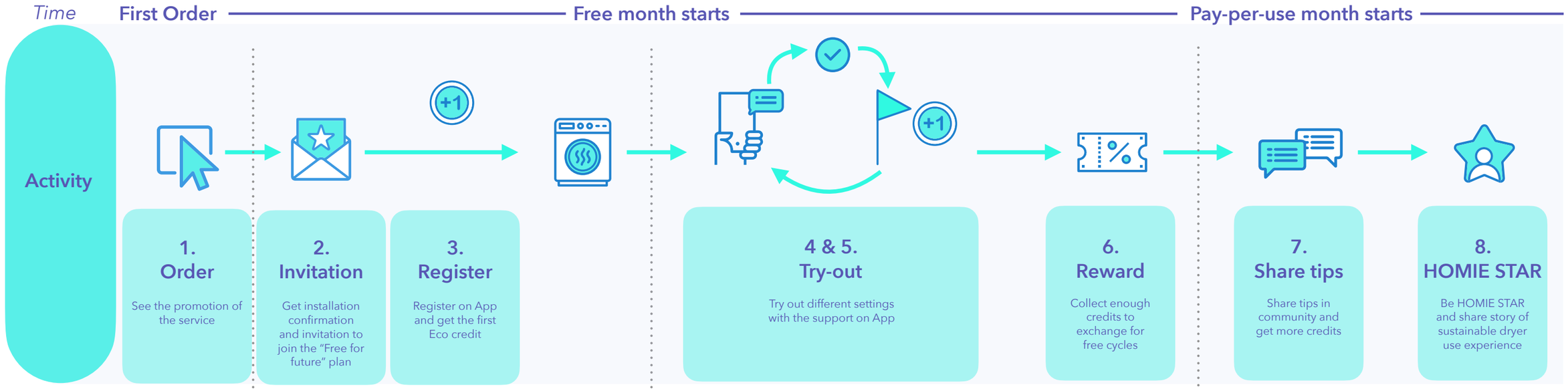


Figure 31. Customer journey of HOMIE Free for Future

In this free month service, the user can try out variable settings with support, bravely, and confidently without considering the cost. The user can also receive the knowledge of sustainable and smart dryer use, which enables them to choose the settings more confident in the pay-per-use months. In this way, users can also feel good to be sustainable and keep motivated by positive feedback, rewards, and social proof.

HOMIE can not only use the free month as a market attractive tool but also use it as a good chance to help users form a sustainable dryer use habit. The rewarding strategy enables HOMIE to turn users to co-creators. Additionally, HOMIE can also collect and analyze users' feedback from the community and share these insights with OEMs.

7.3 Concept Evaluation

Four concepts as explained in the previous section were presented to a group of IDE students from IPD, DFI and SPD for evaluation. These participants hold insights into product design, interaction design, and strategic design. Moreover, they are all dryer users and have the potential to use HOMIE service. The objective of this evaluation session is to assess and validate the four concepts. During the evaluation, two main questions were discussed:

1. *To what extent do the concepts meet the design requirements(as proposed in Chapter 6.3)? Especially, how effective the service is in encouraging and supporting sustainable dryer use behaviours?*

2. *What are the core values and problems of each concept?*

7.3.1 Procedure

Preparation
In order to communicate the concept efficiently, a brief introduction together with storyboards were sent to participants 1 day before the evaluation.

Beginning introduction
At the beginning of evaluation, the design criteria(evaluation form) will be explained to the participants.

Concept presentation
During the evaluation, each concept was presented.

Quantitative evaluation
Participants were invited to fill in an evaluation form, which listed out the design requirements.

Qualtitative feedback
participants were invited to share their opinions on each concept as qualitative input.

7.3.2 Results

Participants were really careful in giving their evaluations. In general, they showed a positive attitude to all concepts but also provided a lot of feedback and inputs on each concept.

Quantitative assessment
Each concept has its strengths and weaknesses in the design criteria of sustainability, business, and user experience, though Concept 4 has the highest score in the assessment. *Figure 32* shows the mean score given by participants(N=10) on all concepts. Participants were then asked to explian the reason why they gave those scores.

Qualitative feedback

Concept 1 - HOMIE All in Hand

☺ Pros

1. A comprehensive platform with all necessary service patterns is a good way to engage users to access the information and support they need.

"I really like these function patterns. It can give me a stronger sense of control. I think it can let users use the product with a peace of mind."

---- *P5*

"Different functions can fit the needs of different kinds of users. So all users can more or less be empowered and aware of their impact on sustainable consumptions."

---- *P9*

2. The priority of service patterns is logical and effective.

"Although there are several patterns, I can see my use flow in it. I will first see my usage data and be aware of my impact. And then I can go to check the tips. After contributing to the environment, I can get rewarded. I think it is smooth."

---- *P7*

☹ Cons

1. A platform is not novel and competitive enough

"I feel this concept is relatively general and may not be attractive enough to the users."

---- *P8*

"The platform doesn't emphasize a key function. So it is hard to differentiate from other competitors."

---- *P9*

1-5 score 1: not effective 3: neutral (ok) 5: very effective	Environmental			Business					User						
	Decrease unnessary use	Decrease unnessary high dryness levels	Encourage the use of ECO mode	Use brand resources (existing product, capabilities, customers, strategies)	Fit value proposition (sustainable, cheap, worry-free, supportive)	Increase user engagement	Create new value stream	Different from competitors	Convenient (time, effort)	Achieve effective laundry drying results	Clear instructions, tips and feedback	Easy to access information	Let the user aware of their achievements to sustainability	Let the user aware of their role in sustainable dryer use	Let customers feel empowered when using the dryer (be supported)
Concept 1 - **HOMIE All in Hand**	2.7	3	3.3	3.7	3.7	3.3	2.8	2.6	3.35	3.325	3.9	4	3.725	3.5	3.525
	mean score: 3			mean score: 3.22					mean score: 3.62						
Concept 2 - **HOMIE Planner**	3.8	3.8	3.5	2.9	3.6	3.9	3	3.6	3.2	3.8	3.9	3.5	3.075	3.6	3.725
	mean score: 3.7			mean score: 3.4					mean score: 3.543						
Concept 3 - **HOMIE Smart Dryer**	3.325	3.8	3.6	2.9	3.7	3.5	3.9	4.2	4.3	4.25	3.5	3.6125	2.9	3.15	3.2
	mean score: 3.575			mean score: 3.64					mean score: 3.56						
Concept 4 - **HOMIE Free for Future**	3.1	3.6	4.5	4.2	4.1	4.8	3.7	4.2	3.1	3.475	4.1	3.5	4.2	4.7	4
	mean score: 3.73			mean score: 4.2					mean score: 3.87						

4.8 Highest score among 4 concepts

Figure 32. Evaluation assessment (for a full assessment from each participant, please check Appendix 8)

2. Too many functions may cause distractions

"In your app you have a lot of functions. The user may have to think about what function to choose. So I'm afraid they will feel distracted in this experience."

---- P5

3. Community is not easy to build

"I'm doubting if the community is necessary and attractive enough to users to communicate in it. Especially when it may cost more effort."

---- P2

Inspirations

1. Combining Concept 2 and Concept 4 can build up an ideal system and have a positive impact on stimulating sustainable behaviours

"I feel the app can add the Planner as a key function and build connections with users."

---- P10

2. Make use of tips and rewards to promote laundry related products.

"I think the tips can link to promotion of side products. And base on that build a community that customers can talk about those products."

---- P5

Concept 2 - HOMIE Planner

Pros

1. Planning laundry in advance is regarded as practical, supportive and effective to the environment.

"I really like it because I am a person that wants to arrange everything in advance, especially the complex ones. And with this planner I can have enough time to think about and decide how to choose the settings."

---- P3

"It targets the entire process of laundry drying experience. And the service journey is fluent. Can bring good user experience. I think if it is implemented in the near future, it will be needed by a lot of people."

---- P9

"This service is practical and well-organized. Users are aware of what they are doing and how to do it."

---- P10

2. The Planner is a good way to collect customer data.

"Because you ask the user to choose their type of laundry, load, and time, I think it can collect a lot of data from customers. So I gave a high score on business value.."

---- P6

Cons

1. Only targeted on the laundry drying process

"Now it only focuses on the laundry drying process. You can think about other parts of the service."

---- P1

2. Not convinced about the recommendations

"I don't really trust… I may have doubts because I don't know how it generates recommendations."

---- P5

3. Should think about how to attract users

"I think you should think about how to let people be attracted and remember to use it."

---- P5

"It would be challenging to let users be engaged and build this habit."

---- P6

Inspirations

1. Involve machine learning

"Maybe you can involve machine learning, so the planner can remember customer preferences. And users can just make small adjustments."

---- P10

2. Link to the user's calendar

"The plan is nice and I think it can be linked to my own calendar."

---- P2

Concept 3 - HOMIE Smart Dryer

Pros

1. Convenient and effortless

"Users only need to take minimal effort and the clothes are dried."

---- P1

"It needs almost no effort. So it's ideal for lazy people."

---- P3

"The entire process is organized and users know what they are doing."

---- P10

2. Smart homes has big potential

"It could be attractive for people who are fond of smart homes or smart devices, which is already a trend. At least I am really interested in these smart things."

---- P2

"It can link to other products of HOMIE, which is nice."

---- P3

Cons

1. Users have limited operation freedom

"Maybe users don't need that much feedback or function, maybe they only need basic."

---- P1

"I worry it is not customer empowerment because it arranges everything for the user. "

---- P3

2. Hard to let users be aware of their environmental impact

"Maybe give more specific feedback and tips while machines planned everything. Then the customers will be more engaged."

---- P3

"It's too smart then people don't think too much. And they may don't have the responsibility."

---- P7

"Maybe the user won't be aware of their contribution to sustainability."

---- P7

3. Trust issue

"How can I trust the machines? Because I have a sense of lack of control. I am worried about it."

---- P5

4. Big investment

"HOMIE needs to be careful about investment. It is a big investment and I don't think users would be willing to pay extra money for it."

---- P2

"It has a high requirement of technologies."

---- P6

Concept 4 - HOMIE Free for Future

Pros

1. Targets on the entire service process.

"This concept has a higher level of service process, not only limited in the dryer use experience, which is nice."

---- P1

2. The free month try out is regarded as effective on forming sustainable habits

"I really like that you operate it in the first month. Because people having a new product have more interest and curiosity."

---- P5

"I like the try-out because I think I really took effort to achieve sustainability. And I get the rewards."

---- P5

"One month is fit because users' laundry behaviour is relatively fixed. And once it is fixed, users won't make big changes on it."

---- P7

3. Eco credits helps the service be more attractive for users

"I find this concept is most attractive because users have more benefits. Convenience on use, free cycles……"

---- P1

"Users can be more stimulated and interested in this service."

---- P3

"Users will have a strong awareness that they are contributing to sustainability."

---- P9

4."Expert in the community" can attract people to follow

"...users can be more stimulated and interested in this service."

---- P5

"I really like the HOMIE star and community so I can go for the 'experts' I trust and follow their tips."

---- P10

Cons

1. Sharing tips requires more effort

"Sharing tips in the community can be a bit overloading."

---- P1

2. Emphasizing the try-out tasks too much may be counterproductive

"Try out all settings may be too much and maybe not necessary. Too many different settings and tips can make me spend too much effort on it rather than dry my laundry."

---- P1

"There's a risk that users may want the credit and raise unnecessary use. Should vary in different household sizes."

---- P7

3. Should think about what will happen after the free month

"I'm doubting if they can really form a habit after one month and if they can still behave in that way."

---- P7

"There seems no feedback on usage after the free month. It is hard to see their own improvement."

---- P7

4. Should think about revenue

"I don't know if HOMIE can generate revenue from it."

---- P5

Inspirations

1. Can be combined to Concept 1 & Concept 2 to be more effective

"Only free try-out is not enough. So maybe you can combine this with concept1 & 2."

---- P6

2. Can apply this strategy to other products

"I feel this strategy has the opportunity to apply to other HOMIE products."

---- P3

7.3.3 Conclusion

Overall, each concept has its advantages and potential problems. The evaluation form and qualitative feedback show that Concept 4(HOMIE Free for Future) is most appreciated and has a big opportunity to be combined with Concept 2(HOMIE Planner). Concept 4 fits the design requirements(*Chapter 6.3*) by making use of the HOMIE's current free-month strategy and is easy to implement. Concept 4 also fulfils the requirements of decreasing dryness levels and providing knowledge and tips to enhance user satisfaction. But it is hard to measure the long-term impact of Concept 4 on sustainable behaviours. Concept 2 has a significant potential to avoid unnecessary use and high dryness levels by enhancing customer empowerment. However, it takes time to implement and needs additional measure to attract users to start to use.

Final design directions will be explained in the takeaways of this chapter.

7.4 Conclusion

Being guided by the design challenges and requirements identified in *Chapter 6*, this chapter merged the creative session ideas, design vision, and the researcher's own creativity to generate the initial pay-per-use dryer concepts to stimulate sustainable dryer use behaviours.

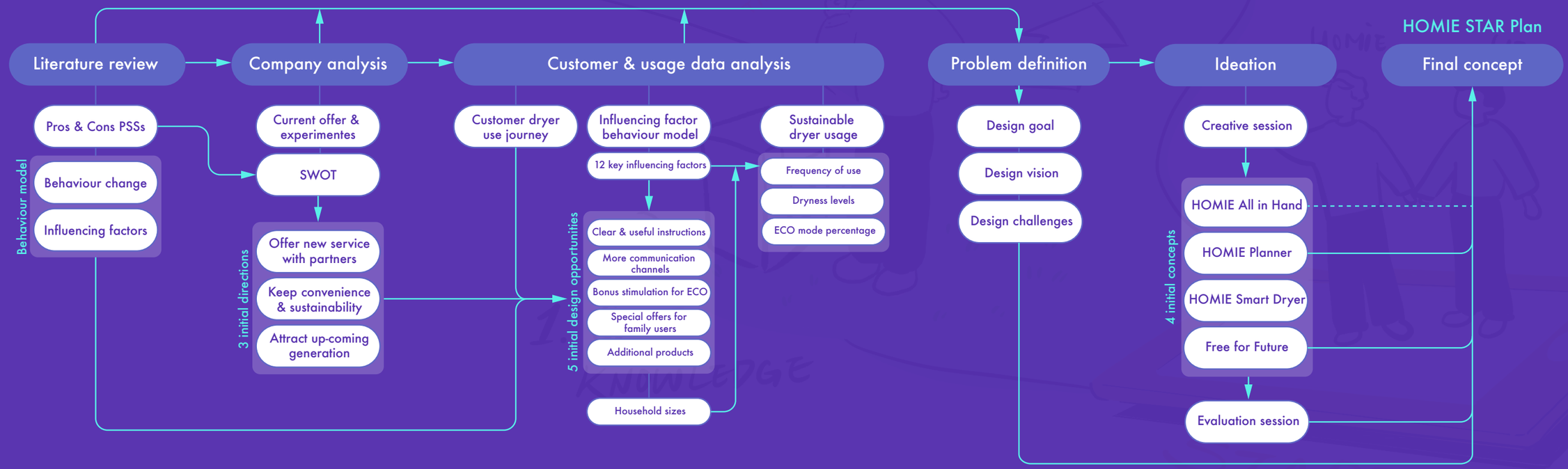
The evaluation provided a more clear direction of creating a solid service system based on the requirements from different stakeholders' perspectives and emphasized the "accept" and "perform" actions in terms of sustainable dryer use behaviour change.

The next chapter will present the final concept.

Takeaways from this chapter

- A mobile app is an ideal tool for building up a communication channel and providing services. Users can access service and information remotely without being limited by time and space. This provides a solution to the design challenge of providing supportive communication(*Chapter 6.2*).
- One of the most important factors is users' participation in the service. As defined in design challenges(*Chapter 6.2*), Users should be attracted and engaged to use the service, which is a key advantage of Concept 4(HOMIE Free for Future).
- The service should support and provide positive confirmation as well as reward to let users be aware of their contribution to the environment. This validates the influencing factors identified in the literature review(*Chapter 2*) and targets the design challenge of enhancing customer engagement (*Chapter 6.2*).
- The strategy needs to include a long-term impact on sustainable behaviours. In other words, only offering an education service in the free month is not sufficient.
- Concept 2(HOMIE Planner) is most efficient in collecting user feedback, which is considered as a big advantage of generating business value and fits the design requirements of exploring new revenue streams(*Chapter 6.3*).
- The final design should include the phases of attracting users, supporting and educating users, making a long-term impact on forming sustainable dryer use habits and generating business value.

Final Concept



▲ *Design process of the final concept.*

Final Concept

The final design presented in this chapter merges the insights from concept evaluation and is consistent with the design vision: *With HOMIE, everyone can organize their housework efficiently and confidently to live a sustainable and pleasant life*. The concept mainly targets on attracting and educating new customers but also aims to involve old customers in this new service.

After presenting the aim, approach, service structure and service phases, this chapter will go through the ideal process of the service by using a service & customer journey and storyboards. Then different service patterns describe how the key service works in detail. Finally, the suggestion for implementing this strategy will be presented.

8.1 Overview

This service strategy is built for the idea of involving and supporting users during sustainable dryer use experience in the long-term. The supportive service is mainly operated on a mobile app that provides information and tools to give users knowledge, help users become sustainable dryer experience organizers and thus helping users to live a sustainable and quality life (*Figure 33*).

The strategy consists of an onboarding service, a supportive tool and an every 6-month ECO challenge. During the entire strategy, users are mainly supported by 3 different tasks and stimulated by goal setting and rewards. The following of this chapter will explain each part of the strategy and related functions with their goals and structure.

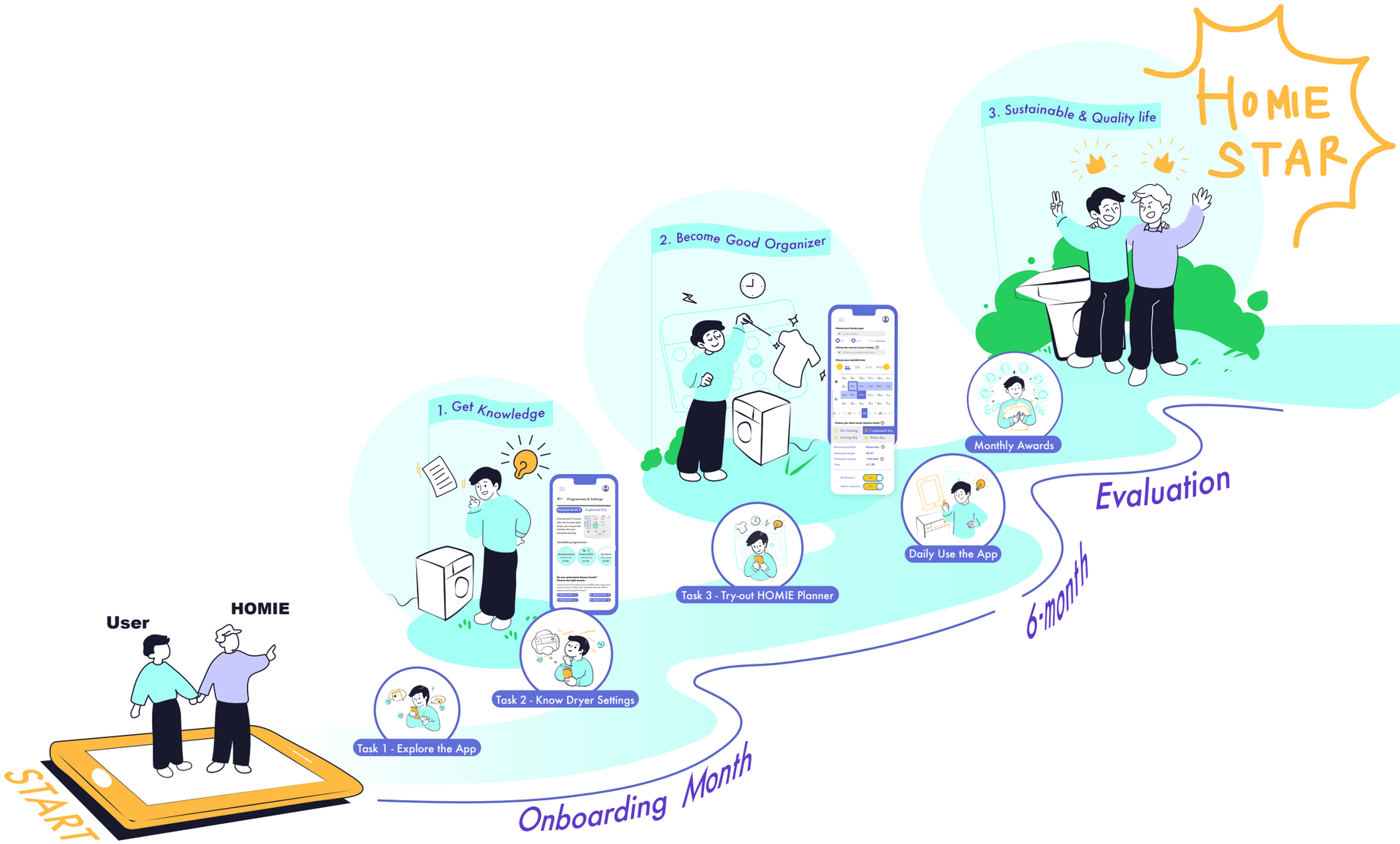


Figure 33. Overview of HOMIE STAR strategy

8.2 Service Structure

The service consists of two phases, of which the onboarding month is for attracting users to accept and get used to the sustainable dryer use support from HOMIE, while the every 6-month evaluation aims to encourage and ensure users to perform sustainable dryer use behaviours in the long-term.

Onboarding Month: Let the user get knowledge and learn how to be a good sustainable dryer use experience organizer.

Every 6-month Evaluation: Let the user become a sustainable dryer use experience organizer and live a quality life.

The setting of these two phases is generated from the current service experiments of HOMIE(for instance, the free month for new customers), research findings and problem definition, and literature (other positive influencing factors to sustainable dryer use behaviours). *Figure 34* shows the consideration of the phases.

8.2.1 HOMIE STAR strategy

The service strategy is aiming at supporting HOMIE users(both old and new) to become sustainable dryer users-----HOMIE STARs who live a sustainable and quality life. To achieve this goal, HOMIE provides a system of service to involve, encourage and support users to gain sustainable dryer use related knowledge and use tools to organize dryer use experiences.

Criteria of HOMIE STARs

1. *Be sustainable:* Manage to use ECO mode over 80% for each month.
2. *Be experienced and helpful:* Be able to help other users(i.e. share tips in community)

Overall strategy of HOMIE STARs

Every 6 month, HOMIE will evaluate its pay-per-use dryer users with the criteria. The users who become HOMIE STARs can get prizes from HOMIE and have priority in HOMIE service(including the priority in maintenance and trying out new HOMIE products).

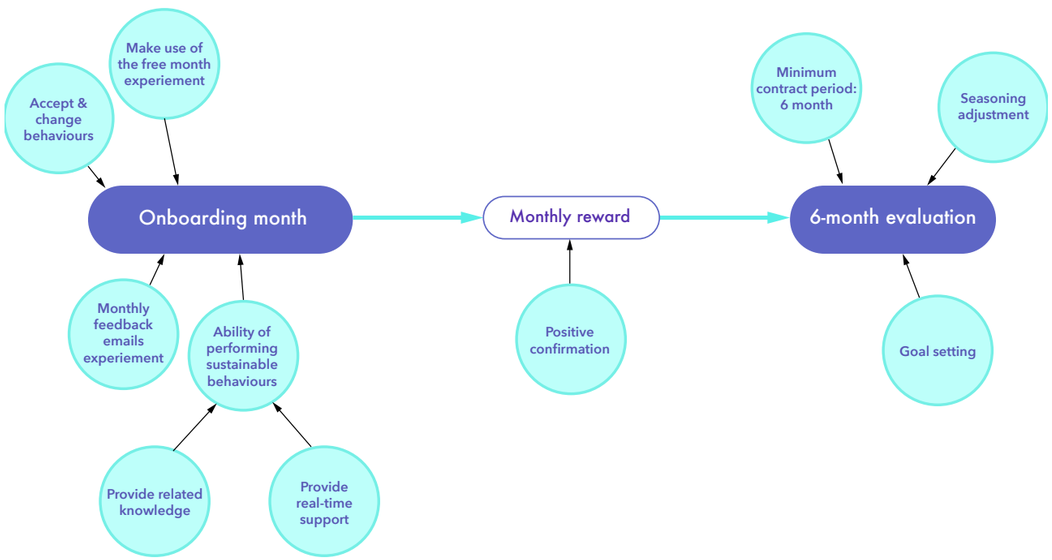


Figure 34. Consideration of two strategy phases

HOMIE will first introduce the HOMIE STAR strategy and motivate users to take this challenge. With a one-month onboarding service, HOMIE will involve and encourage the users to gain sustainable related knowledge and learn how to use the app as a tool for organizing sustainable dryer use experiences.

After the onboarding month, users can make a better plan with supportive tools on the app for their daily dryer use experience, thus reaching the goal of using the ECO mode above 40&/60%/80% every month. Users can collect ECO credits for free cycles by achieving these goals and sharing tips/ answer questions in the community. To continuously encourage the users to perform sustainable dryer use behaviours, a monthly evaluation strategy is applied to give users positive confirmations and stimulations.

When users complete the challenge(using the ECO mode over 80% per month) and become HOMIE STARs, they will be encouraged to participate in the next 6-month evaluation challenge. The other users who didn't become HOMIE STARs will still get a 6-month reflection about their achievements (including the cost and energy they saved, the ECO credits they gained, comparison with other users, etc.) and be encouraged to keep chasing the goal. In this way, HOMIE can stimulate and support users to perform sustainable dryer use behaviours in the long-term.

This strategy will be further analyzed in a detailed service journey map in *Chapter 8.3* and detailed service patterns in *Chapter 8.4*.

8.2.2 Influencing factors in each phase

Based on influencing factors identified in literature review and customer research, different service patterns are designed to provide motivations, abilities and triggers to ensure the desired behaviours to happen. *Figure 35* shows how each service pattern serves as drivers of different sustainable behaviours and the influencing period they mainly target.

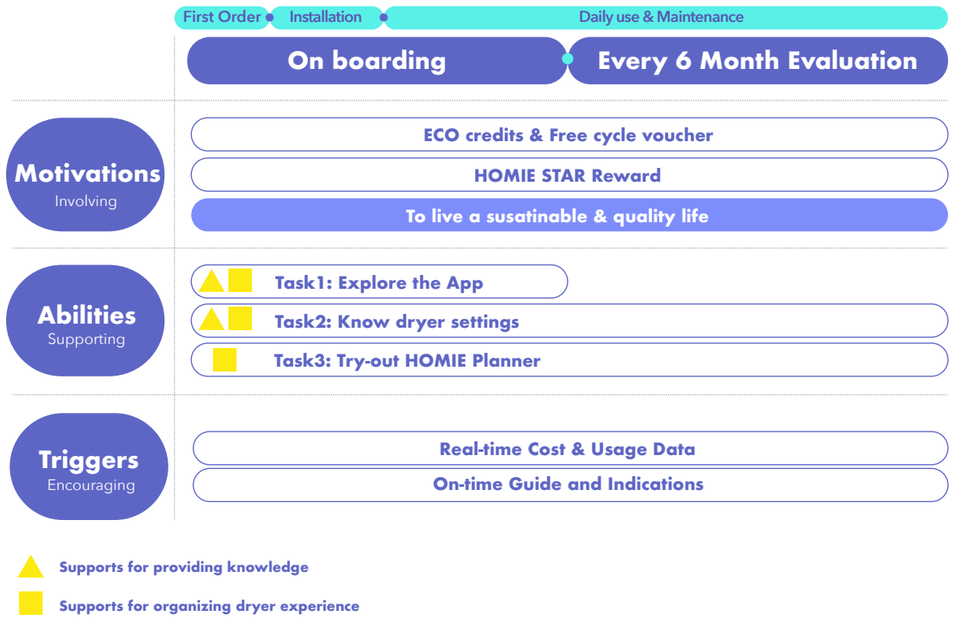


Figure 35. Target of service patterns in each phase

Final Concept

8.3 Service & Customer Journey

Figure 36 illustrates the service and customer journey(targets mainly new customers) of the HOMIE STAR strategy. The key activities are analyzed in a timeline from the first order until the first 6-month evaluation. Besides, the related communication channels are mapped out to explain where and how HOMIE can provide this service. The analysis of function patterns along the journey explains how different function patterns in the HOMIE App can support the entire service. Finally, the journey mapped out the materials that HOMIE needs to provide in each service touchpoint.

A storyboard on the next pages will provide a clear view of how the user experiences this service. In the next section, the key service and tasks will be further explained.

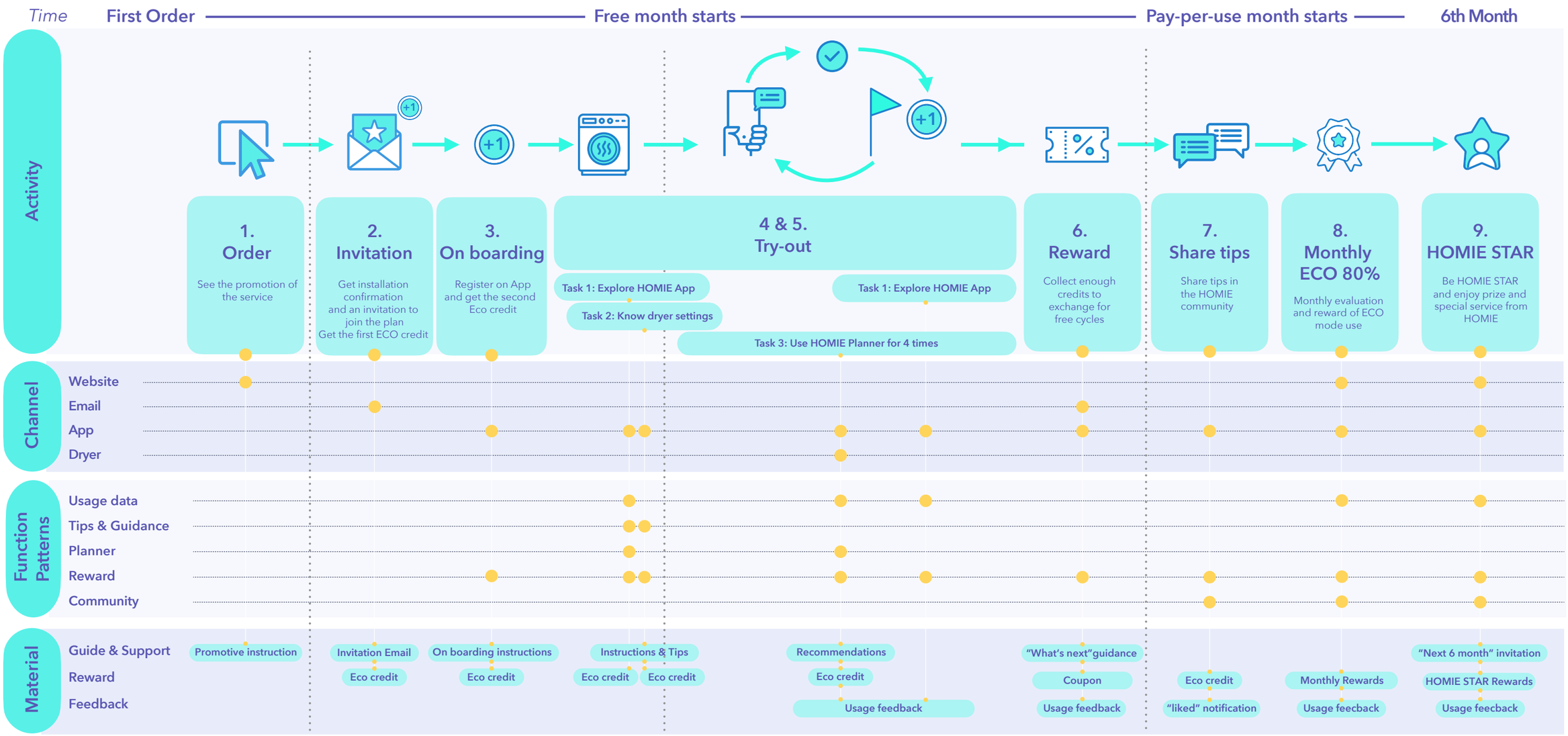


Figure 36. Service & customer journey map

Frank, a young urban professional who is busy at work but still want to live a pleasant life. So he decides to get a laundry dryer. He browsed on web and found that HOMIE offers pay-per-use dryers and a sustainable-oriented service, which meets his needs.

1. Get interested and inspired by the HOMIE STAR challenge on the order page.

2. Receive the an invitation email with service explanation, and gets the first ECO credit which shows that he is already one step closer to the HOMIE STAR goal.

3. Download and register on the App and get the second ECO credit

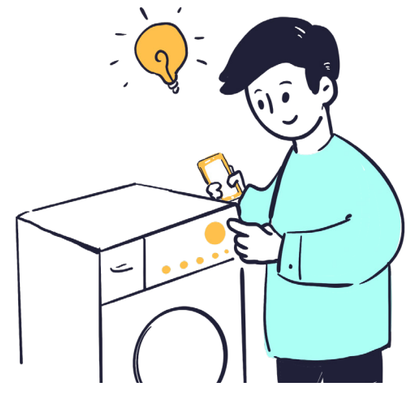
4. Be encouraged to browse the App and get to know the key services that he can make use of. (Task 1)

Figure 37. Strategy Storyboard (continues in the next page)

5. Be encouraged to read through the short and clear instructions to get to know the dryer and different settings before installation. (Task 2)

6. Be encouraged to try out the Planner tool to plan his dryer use experiences. (Task 3)

7. Get notification with recommendations from the Planner. (Task 3)



8. Choose the settings confidently. (Task 3)

9. Know the drying progress remotely when the dryer is working. (Task 3)

10. The dryer is done! Get desired laundry drying results successully! (Task 3)

11. Digital invoice: Receive laundry drying feedback and be aware of energy consumption as well as the cost. Get personally suggestions of the next use. (Task 1& 3)

12. Plan for the next dryer use experience. (Task 3)

Figure 37. Strategy Storyboard (continues in the next page)

13. Free month end. Finish all tasks and get enough ECO credits. Win a free dryer cycle.

14. Continue to use the dryer with supportive tools, knowledge, and confident. Get the best laundry drying results and be sustainable.

15. Share tips or answer questions in the community to inspire other users and collect ECO credits. Ask in the community when have questions and get help from HOMIE or other users.

16. Managed to use ECO mode for over 40%/60%/80% each month and unlock different levels of awards. Collect ECO credits accrodingly for free cycles.

After 6 month, Frank manages to reach the ECO goals, lives a sustainable and pleasant life and becomes a HOMIE STAR.

Figure 37. Strategy Storyboard

8.4 Service patterns

This section will explain the main service patterns in detail. For each service pattern, the goal, procedure, materials, targeted influencing factors and how this service contributes to stimulating sustainable dryer use behaviours are presented. In addition, the related storyboard will be shown to envision how the user would interact with the related service.

The influencing factors identified from the literature review and customer research will be highlighted following the explanation of each pattern.

- *influencing factors identified in literature*
- *influencing factors identified in customer research*

Attract customers

Goal

Attract and motivate customers to participate in the new service, achieving sustainable dryer use goals and becoming HOMIE STARs.

What

New HOMIE customers will encounter the instruction of HOMIE STAR plan on HOMIE's website (especially on the order page). The instruction includes what can HOMIE STARs get and how to reach the goal. After ordering, customers will receive installation confirmation together with an invitation email, which invites the customers to participate in the HOMIE STAR plan and further explain how this plan works. Meanwhile, the customers will also receive their first ECO credit, which indicates that they are already making progress in this plan and are one step further than general dryer users in sustainability.

The existing HOMIE customers will encounter the promotion of HOMIE STAR plan together with the first ECO credit on their account page and monthly emails.

Figure 38 shows an example of the materials.

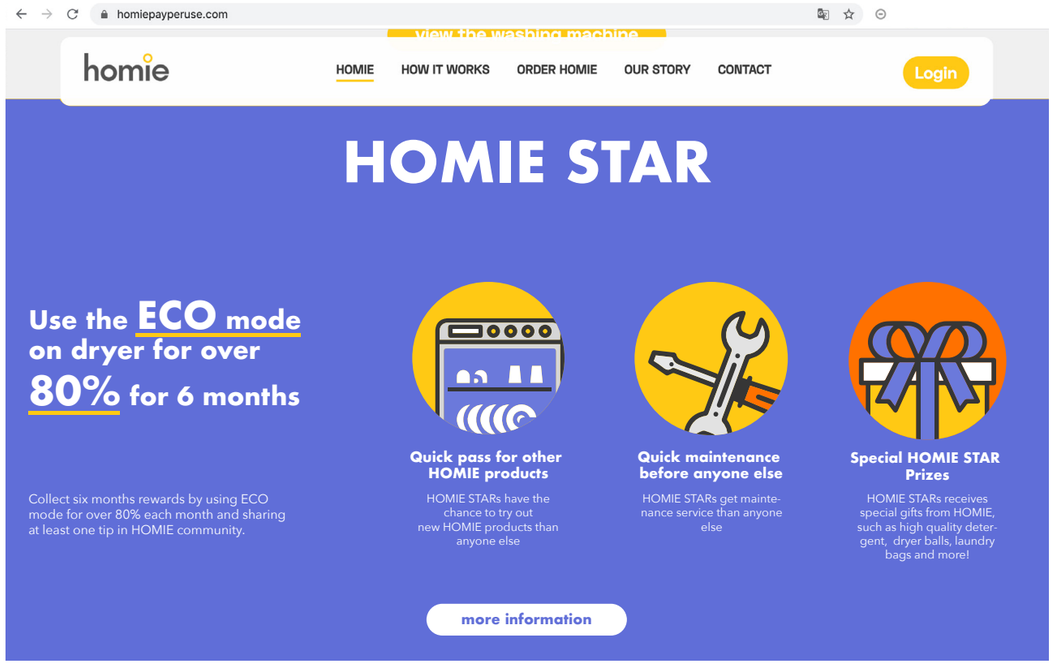


Figure 38. Example of the HOMIE STAR promotion on HOMIE's website

Behaviour factors in this service

Motivation
- Get the HOMIE STAR reward
- Concern of sustainability
- (for new HOMIE customers) Free month

Ability
- Clear instructions and guidance to help customers participate in this plan

Trigger
- (for new HOMIE customers) Promotion at the order moment and waiting for installation moment
- (for existing HOMIE customers) Promotion at the moment they top up their accounts)

Contribution to sustainable dryer use behaviours

Motivation

Goal setting: By setting becoming HOMIE STAR as a goal, HOMIE is able to attract and motivate customers to participate in this sustainable oriented service.

Ability

Ease of use & access: The instructions provide customers a clear view of the HOMIE STAR plan, thus enabling the users to understand the criteria of sustainable dryer use behaviours.

Trigger

Positive confirmation: The first ECO mode and instructions trigger customers to start envisioning themselves as becoming sustainable dryer users.

Related Storyboards

1. Get interested and inspired by the HOMIE STAR challenge on the order page.

2. Receive the an invitation email with service explanation, and gets the first ECO credit which shows that he is already one step closer to the HOMIE STAR goal.

Task 1 - Explore the HOMIE App

Goal

Guide and encourage the users to have a clear view of the service and tools that they can access and use.

What

After the user registered on the App, a quick guide of how to explore the key function patterns on the App will appear. The user can tap into each function pattern and get an overview of how these functions provide information or support.
Users will receive an ECO credit after exploring each function pattern.

Figure 39 shows the examples of how the exploration guide works:

Behaviour factors in this service

Motivation
- Curiosity to the new App
- Finish tasks for rewards
- ECO credit

Ability
- Use the App at spare time
- Ease of access: Quick process of exploration
- Ease of use: Step-by-step guide

Trigger
- Pop-up guides

Contribution to sustainable dryer use behaviours

Motivation
Role for using the system: By having an overview of information and support on the App, the user will be more engaged in making use of the App for performing sustainable dryer use behaviours.

Ability
Ease of use & access, self-efficacy: The user gets the knowledge of how to use the App as a tool for achieving sustainable dryer use behaviours.

Trigger
The user will be triggered by the function patterns and start to use each service before the installation of the dryer.

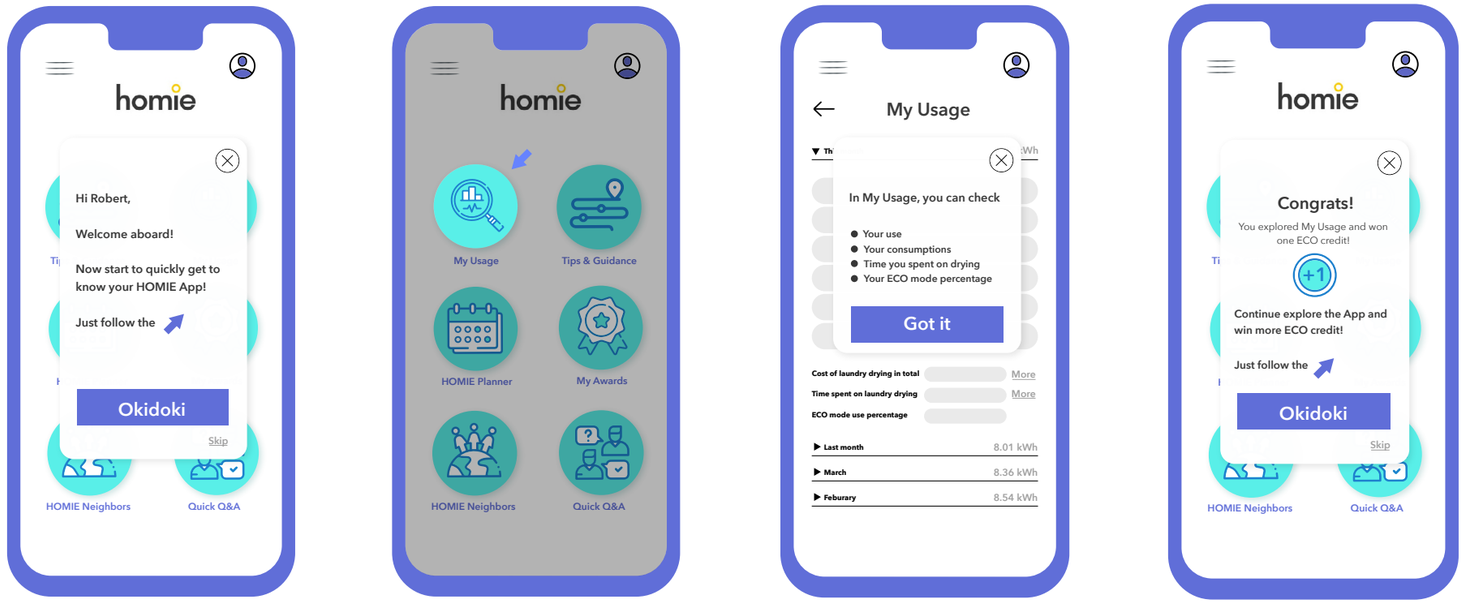


Figure 39. Examples of the exploration guide

Related Storyboards

3. Download and register on the App and get the second ECO credit

4. Be encouraged to browse the App and get to know the key services that he can make use of.

Task 2 - Know dryer settings

Goal

Introduce different settings on the dryer. Let the user learn and understand the key functions, energy consumption, and other tips of each setting. In this way, HOMIE can help the user to get the knowledge of why and how to choose sustainable dryer settings and enable users to select the settings with more confidence.

What

This task requires the user to read through the instructions of each programme and settings in the Tips & Guidance pattern. The contents in this pattern are mainly about the instructions of different programmes and dryness level settings on the dryer and general tips about sustainable dryer use, which are already provided by HOMIE via PDF files and website.

After reading each part, the user will be asked to answer one or two multiple-choice questions about the related programmes or settings. Only by choosing the correct answer can the user earn the ECO credit.

Figure 40 shows the examples of how Task 2 works.

Behaviour factors in this service

Motivation
- Curiosity to the dryer and settings
- Finish task for rewards
- ECO credit

Ability
- Use the App at spare time
- Quick process of reading and understanding
- Quick-answer questions

Trigger
- Instructions and guide
- Happens at timing around installation day

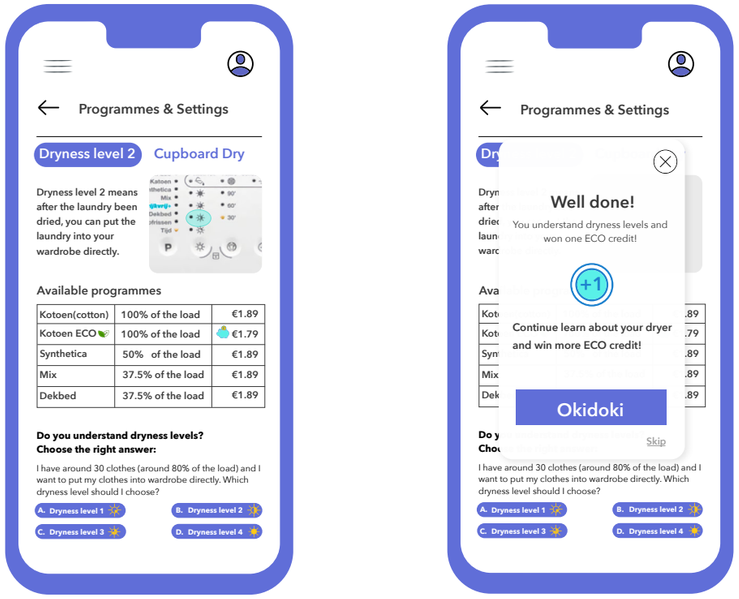


Figure 40. Examples of Task 2

Contribution to sustainable dryer use behaviours

Motivation
Role for using the system, trust: By getting the knowledge of different settings, users are more confident to operate the dryer. Moreover, the user can have the insights of why and how to choose the settings, which helps to build trust in the HOMIE Planner.

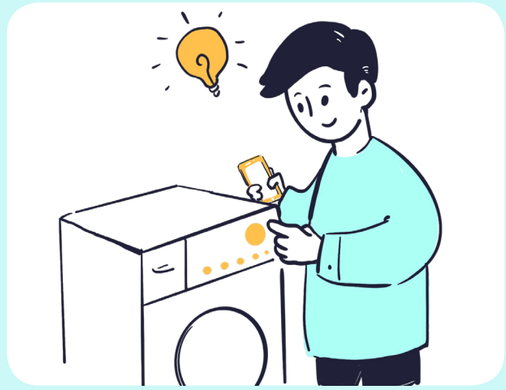
Ability
Ease of use & access, *self-efficacy*, *knowledge of settings*: The user gains the knowledge of how to choose the settings and is able to use the dryer in a more sustainable way.

Trigger
Tips at different touchpoints: The user can easily look back into the instructions and tips and then be triggered and guided by the knowledge to choose sustainable settings.

For this task, the user needs to take more effort and spend more time to finish. Therefore, the instructions should be short and clear enough, and attract users' interest. For instance, the instructions can include more visuals and keep a sense of humour.

Related Storyboards

5. Be encouraged to read through the short and clear instructions to get to know the dryer and different settings before installation.



8. Choose the settings with more confident.

Task 3 - Try-out HOMIE Planner

Goal

Task 3 requires more effort than the previous two tasks, but can bring more support in enhancing the quality of using the dryer, and aims to effect on user behaviours in the long-term.

Generated from Concept 2, this task targets directly on the use phase and is aiming to encourage the user to use HOMIE Planner as a tool to organize their sustainable dryer use experiences. From the try-out experience, the user has the chance to see the values the Planner can bring to their laundry drying experience and daily life. In this way, HOMIE can persuade and encourage the user to continue using the Planner in daily use.

What

When the dryer is installed, the user will get a notification of organizing a dryer use experience with the HOMIE Planner.

The user will make the plan by selecting the type and amount of the laundry, choosing the available time for doing the laundry, and selecting the results they want to achieve(as shown in *Figure 41*). Ideally, the user already finished Task 2 so that the user basically understands what does each selecting filter mean. If the user is still not sure about the filters, the user can check the related instructions easily. After the user selected the filters, a recommended setting and together with the estimated energy consumption as well as estimated length of time will be presented.

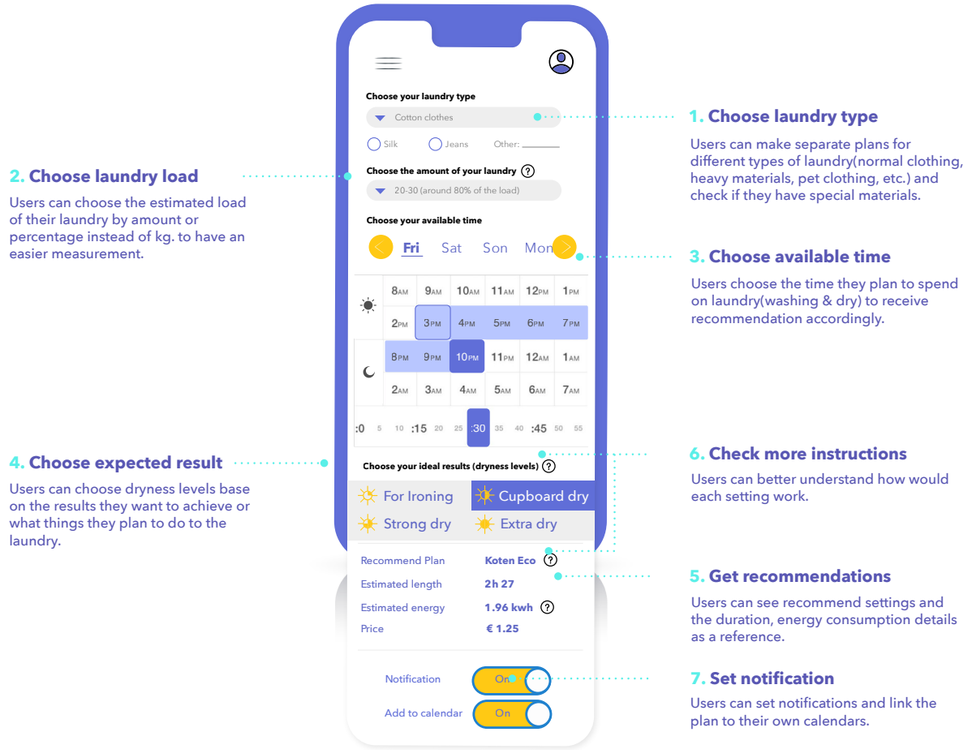


Figure 41. Example of the HOMIE Planner

Based on the information, the user can decide whether to take this suggestion. Then, the user can set up a notification and link this plan to his/her calendar.

The Planner will remind the user 1 day before to start sorting and preparing laundry. 15 mintues before the time the user planned, the user will be notified to start washing. Then, 15 minutes before the time the user planned to dry, the Planner will notify the user together with the recommended settings. The user can then follow the recommendation and choose the settings confidently.

During the laundry drying, the user can easily check the real-time process of the dryer remotely. This function provides the user with a stronger sense of control and worry-free experience, thus enhancing user satisfaction of the service and motivating the user to continue to use the Planner.

After the drying, the user will receive useful feedback which contains the time, price, and energy consumption. In this way, the user can be more aware of the environmental impact of different settings. The user can then plan for the next use right after receiving this feedback.

Considering the monthly use frequency of users identified in *Chapter 5*, the task will require the user to try this service at least 4 times and give the user ECO credits after each trail.

From the filter selecting function, HOMIE is able to collect user preference data. By analyzing this data, HOMIE can optimize its service and has the opportunity to establish partnerships with design companies and OEMs by sharing user insights.

Figure 41-43 shows the examples of how Task 3 works.

Related Storyboards

6. Be encouraged to try out the Planner tool to plan his dryer use experiences.

7. Get notification with recommendations from the Planner.

8. Choose the settings confidently.

Behaviour factors in this service

Motivation
- To have a better plan for daily life
- Finish task for rewards
- ECO credit

Ability
- Organize the dryer experience at spare time remotely
- Access information easily and remotely
- Step-by-step guide

Trigger
- Notifications

Contribution to sustainable dryer use behaviours

Motivation
Deeper product satisfaction, *getting the laundry dried efficiently*: By pre-planning the dryer experience, the user is motivated to think about how to choose the settings carefully. The Planner also motivates the user to form a habit by making regular plans in daily use.

Ability
Knowledge of settings, *less mental cycles*: The user is enabled to make a more logic plan and decision in terms of sustainable dryer use experiences and daily life schedule. During this process, the user won't take too much mental effort to remember the time and preparation to do the laundry and decide how to choose the settings.

Trigger
Real-time feedback, *feed-forward*:Real-time recommendations and notifications can trigger the user to actually perform sustainable behaviours. The feedback and tips after use trigger the user to make new plans based on the experience.

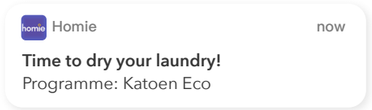


Figure 42. Example of the notification

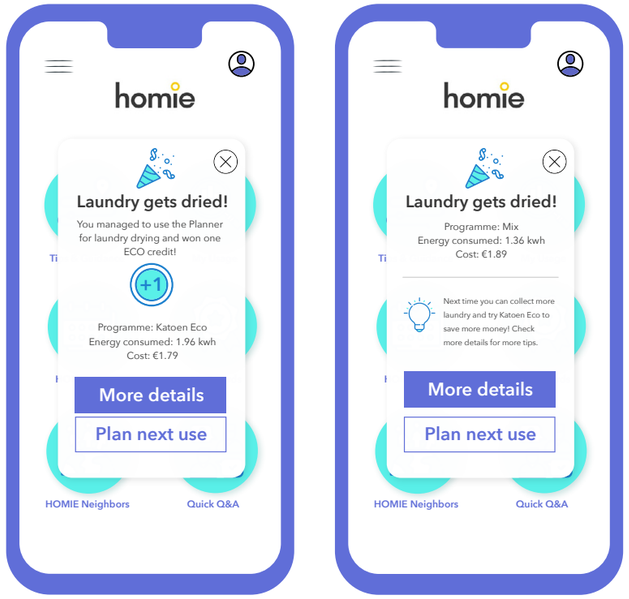


Figure 43. Example of the laundry drying feedback in Task 3 (left) and during normal use(right)

Collaboration opportunity

HOMIE has the opportunity to collect customers' preferences via the Planner with permission. By sharing the analyzed customer feedback and insights, HOMIE can seek collaboration opportunities with design companies and OEMs. For instance, HOMIE can collect the most frequently used programmes, most frequency laundry load, most frequency dryness results and share these insights with dryer designers. Dryer designers and OEMs can then use these insights for the development of sustainable dryers, such as the innovation of ECO mode for different dryness models, adjusting machine load for different settings, considering the future design direction of smart machines, etc. HOMIE needs to persuade these stakeholders with the innovation opportunity for gaining competitive advantages that fulfil real user needs in the market.

9. Know the drying progress remotely when the dryer is working.

11. Digital invoice: Receive laundry drying feedback and be aware of energy consumption as well as the cost. Get personally suggestions of the next use.

12. Plan for the next dryer use experience.

Every 6-month evaluation

Goal

The main goal of every 6-month evaluation is to ensure the user to perform sustainable dryer use behaviours in the long term.

What

Monthly evaluation and rewarding
After finishing all tasks in the onboarding month, the user will unlock the first reward batch "Best Beginner". Then for each month, if the user meets the goal of using ECO mode for over 40%/60%/80%, the user will unlock different levels of monthly reward badge(named such as "ECO friend", "ECO lover", "ECO Expert", etc.) and get the ECO credits accordingly. The monthly rewards aim to keep the user motivated and engaged in the HOMIE STAR plan by breaking large gains into frequent smaller gains(IIT Institute of Design, 2010).

Community
Additionally, the user is required to share at least one tip of doing laundry or answer one questions to help other users in the HOMIE online community. Since at this period, the user already has some experience and self-concluded tips related to sustainable dryer use behaviours(*Chapter 4*), the user can then share tips to inspire other users. Besides, the user may have specific questions during the experience and can then ask in the community. HOMIE can act as an expert to answer those questions together with other experienced users.

6-month evaluation
And the end of each 6-month, the user will be evaluated and receive a conclution of the total achievements(includes money saved). If the user managed to use the ECO mode over 80% for 6 months and shared at least one tip/answer in the community within this period, the user will get the HOMIE STAR reward.

Figure 44 shows the examples of monthly rewards.

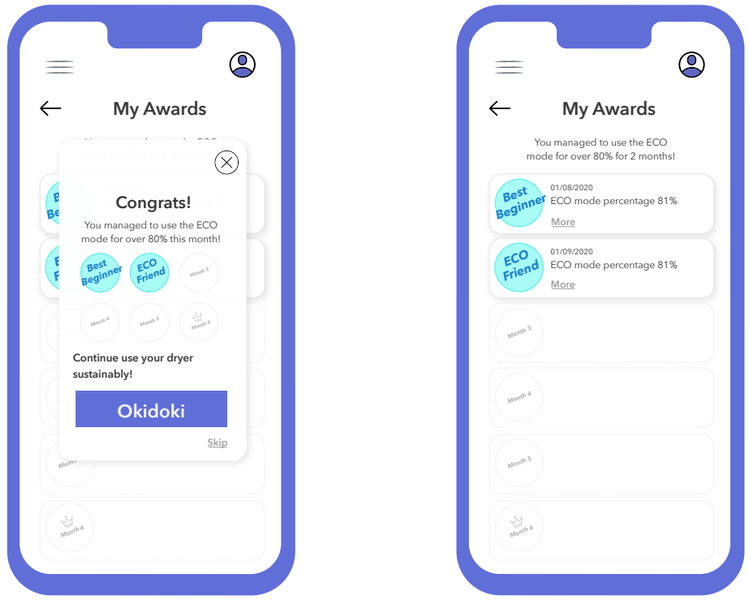


Figure 44. Examples of monthly rewards

Behaviour factors in this service

Motivation
- Concern about sustainability
- Free cycles and other rewards
- Positive confirmation

Ability
- On-time rewards to inform users about their sustainable results

Trigger
- Reward notification as positive confirmation and feed-forward

Contribution to sustainable dryer use behaviours

Motivation
Deeper product satisfaction,*environmental concern*: By providing monthly rewards as positive confirmations and goals, HOMIE is able to motivate the user to keep performing sustainable dryer use behaviours.

Ability
Self-efficacy: The user can have a clear view of their sustainable dryer use progress and adjust dryer use behaviours accordingly.

Trigger
Reward, *positive confirmation*: Rewards can keep triggering the user to insist on using the dryer sustainably, thus ensuring long-term impact on dryer use behaviours.

Collaboration opportunity

HOMIE can collaborate with ethical and sustainable side product companies in terms of the HOMIE STAR prizes by providing advertisement on HOMIE website and the community. For instance, HOMIE can partner with the Friendsheep Eco Dryer Balls, which are hand made by women with disabilities in Nepal(www.friendsheepwool.com). This kind of collaboration can also benefit the enhancement of brand authenticity.

Related Storyboards

16. Managed to use ECO mode for over 40%/60%/80% each month and unlock different levels of awards. Collect ECO credits accrodingly for free cycles.

17. Become HOMIE Star.

8.5 New Business Model Canvas

By offering the new service, HOMIE will have a new business model by developing its value proposition, attracting new customer segments, building new partnerships and finding new revenue streams.

Value proposition:

Besides affordability, worry-free, Eco-aware, and flexibility, HOMIE will offer supportive service to further empower customers not only in sustainable dryer use experience but also in making a better plan for daily life.

Customer segments:

As defined in Chapter 6, the new service strategy targets young urban singles, couples and families who are busy with work but are aware of sustainability and seeking high-quality daily life. This type of people are already HOMIE's potential target but are hesitating to take HOMIE's pay-per-use services rather than buying a machine or choosing leasing companies. The new service emphasizes the keywords "high quality" and "sustainable", which motivates the young urban professionals to decide to become HOMIE dryer customers. The supportive service also has the potential to enhance customer loyalty and lead to longer customer relationship.

Key partners:

As mentioned in the previous section, HOMIE has the opportunity to collaborate with laundry product companies such as Friendsheep. Furthermore, HOMIE has the potential to build partnerships with design companies and OEMs by sharing user insights. In the future, these stakeholders can become HOMIE's partners.

Revenue streams:

By collaborating with laundry product companies,

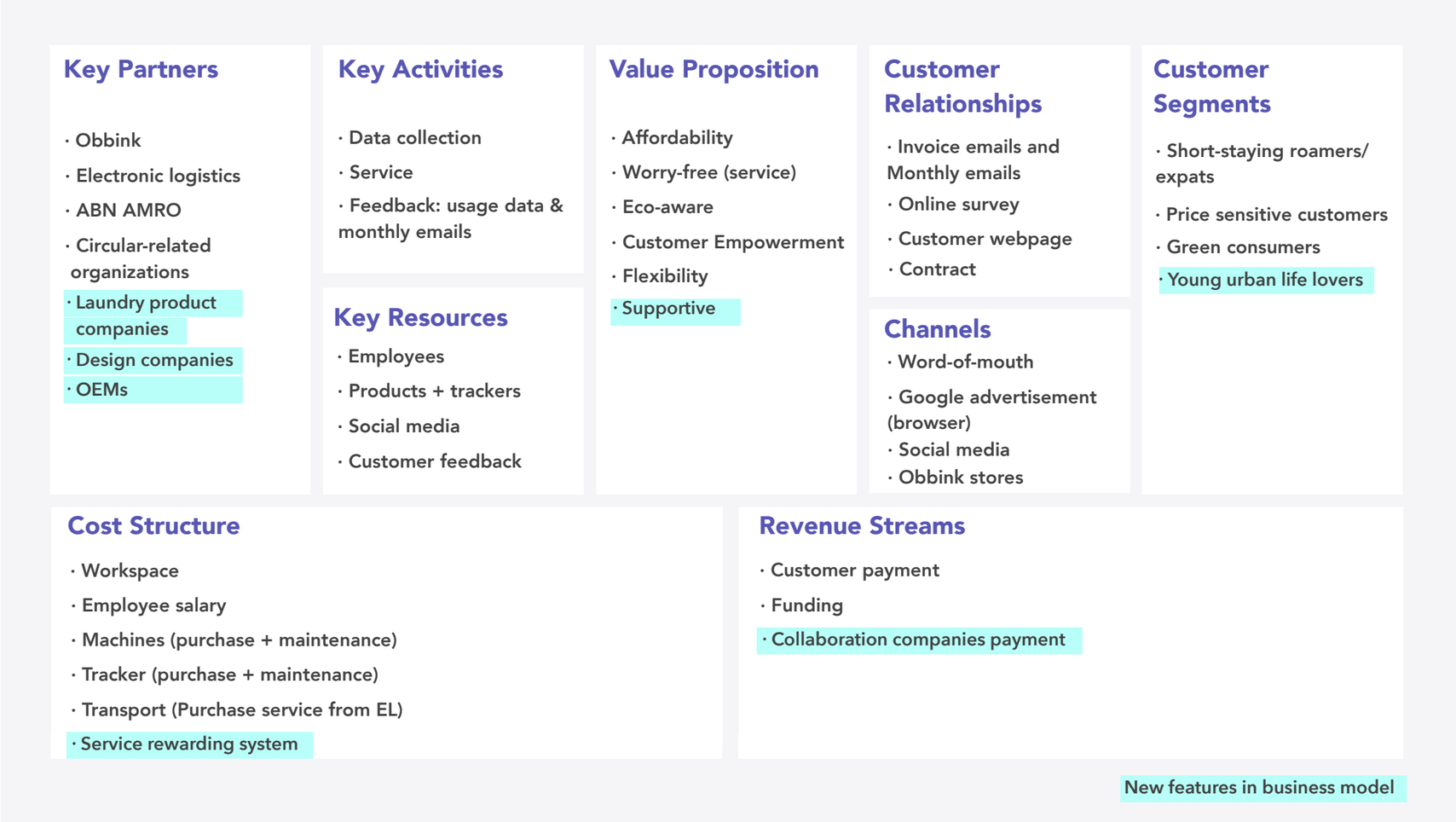


Figure 45. Ideal Business Model Canvas of HOMIE Pay-Per-Use Dryer

design companies and OEMs, HOMIE has the opportunity to gain revenues from sharing advertisement resources, user insights, and raising more fundings.

Break-even point calculation:

The rough estimation of cost and revenue is presented below. The break-even point is calculated as HOMIE fully implement the service strategy at once. *Appendix. 9* shows the calculation details.

Cost

The main investment in implementing this service will be the cost of building the App. According to estimates by howmuchtomakeanapp.com, the cost is approximately €72,600. The fee will be divided according to the number of customers(dryer machines).

The free cycle reward strategy will cause addition cost. Below is the rough estimation of ECO credits given away per month.

ECO level	ECO credit	Amount of customers (%)
40% ECO mode	2 ECO credits	40%
60% ECO mode	5 ECO credits	40%
80% ECO mode	10 ECO credits	20%

10 ECO credits = 1 free cycle

Table 4. Estimation of ECO credits given away per month

HOMIE has reduced their price scheme of dryer with an average of €1.7(since July 1st, 2020. See *Appendix.X* for the overview of new price scheme). Based on this price scheme, this free cycle rewarding cost per customer per month will be €0.816.

Profit

The profit that could generate more revenue is the growing group of customers. The estimated size of customers of all HOMIE products will grow to around 3000.

HOMIE has reduced their price scheme of dryer with an average of €1.70. According to usage data analysis in *Chapter 5*, the average frequency of use will be around 7.92. Therefore, the use fee per customer per month will be €13.464.

Sharing preference data insights with other supply chain stakeholders (OEMs and design companies) also brings revenues. Currently, there's no open information about the price of user insights. The revenue per customer will be estimated according to how users value their data, which is around €128($150, identified by SYZYGY, 2018).

Break-even point for a single dryer machine will be:

Models	***Break-even point***
Current model	*41 months*
HOMIE STAR(without data sharing)	*46 months*
HOMIE STAR(with data sharing)	*36 months*

If HOMIE can manage to build collaboration on sharing customer insights with design companies and OEMs, the company will have its break-even point 5 months before compared to its current model.

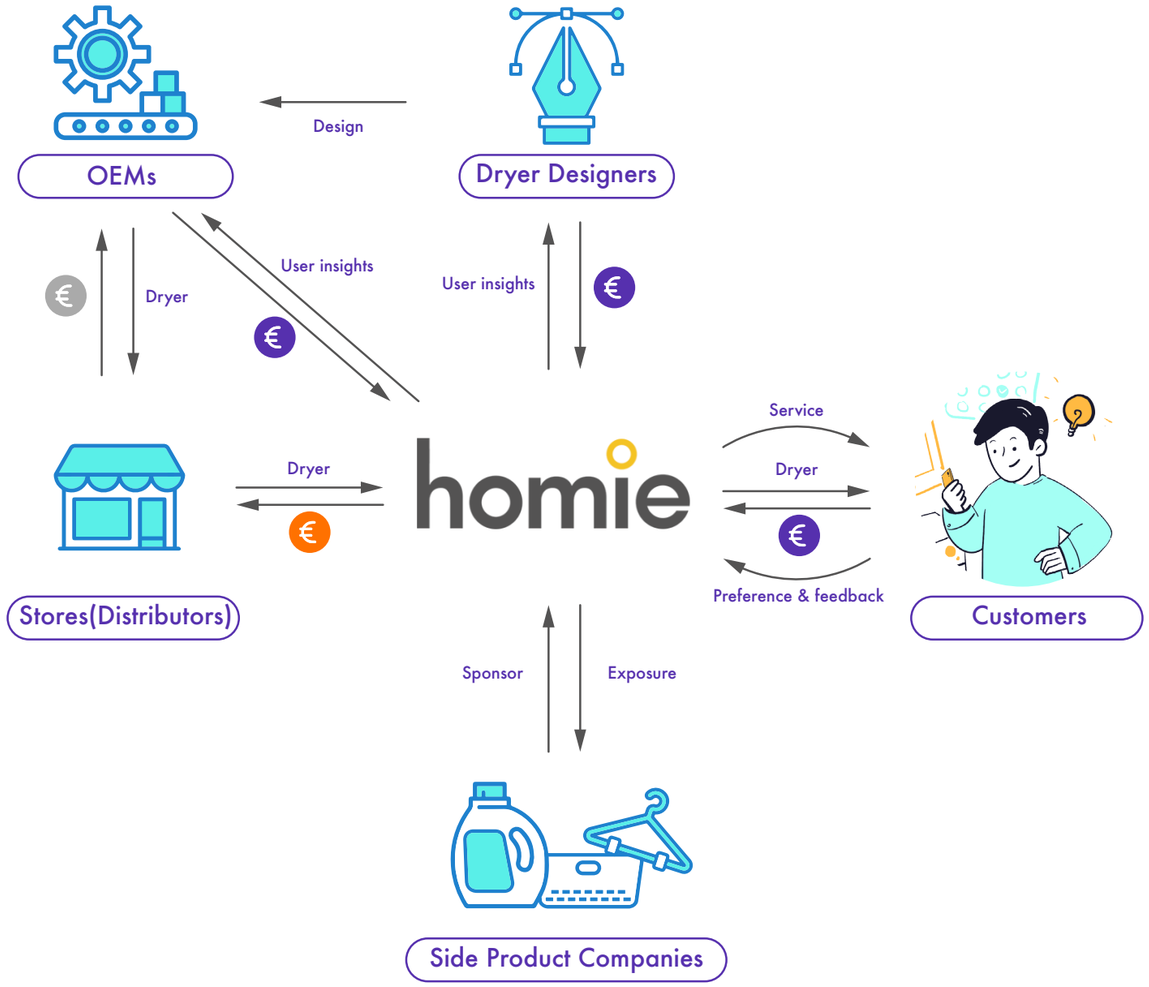


Figure 46. Stakeholder map of the new strategy

8.6 Implementation suggestions

The suggestion is to first apply some elements(for instance, the community and ECO credits) into the existing communication channels (website and emails). Then realize part of the service patterns in the first version of the HOMIE App. Other service patterns which require more time, money and effort such as the HOMIE Planner will be implemented when HOMIE has a larger group of customers so that the service can make a more significant impact.

Pre-launching

As part of HOMIE's users already managed to use the ECO mode for over 80%, HOMIE can first introduce the HOMIE STAR rewards before launching the HOMIE App. In this way, HOMIE can stimulate the curiosity of users and promote the HOMIE STAR plan among existing customers.

During this period, HOMIE needs to work on the development and implementation of the HOMIE App. Since most mobile apps take 4-6 months in building, the estimated development time of HOMIE App is around 6 months(Yarmosh, 2019).

Besides, HOMIE can encourage users to share their tips in terms of sustainable dryer use behaviours, sustainable laundry related products, and laundry plan management through emails. These collected tips will be used for developing the HOMIE community.

Meanwhile, HOMIE can start to contact side product companies for the collaboration of prizing.

Launching

6 month after pre-launching, the first group of HOMIE STARs will come out. HOMIE can take these HOMIE STARs as a model to inspire and attract new customers to participate in the HOMIE STAR plan. In the meantime, HOMIE can start to apply the HOMIE App as a tool for promoting sustainable dryer use.

Meanwhile, HOMIE can start to ask users for the permission of collecting their feedback via HOMIE Planner. With permission, HOMIE can start to analyze and get insight from users' preferences and usage data, thus preparing for the collaboration with design companies and OEMs.

Post-Launching

The post-launching experiments are mostly about developing the service system and seeking collaboration to open new revenue streams.

After launching the HOMIE STAR plan, HOMIE can interview the users for the feedback of the new service system and test the possibility to further develop and apply this service to other HOMIE products.

Additionally, if HOMIE gets the permission of collecting and sharing users' feedback, the company can build up partnerships with design companies and OEMs. Furthermore, HOMIE can invite designers and OEMs to join the HOMIE community and share their insights in terms of sustainable dryer use. In this way, HOMIE can exchange insights and resources with other experts in the industry.

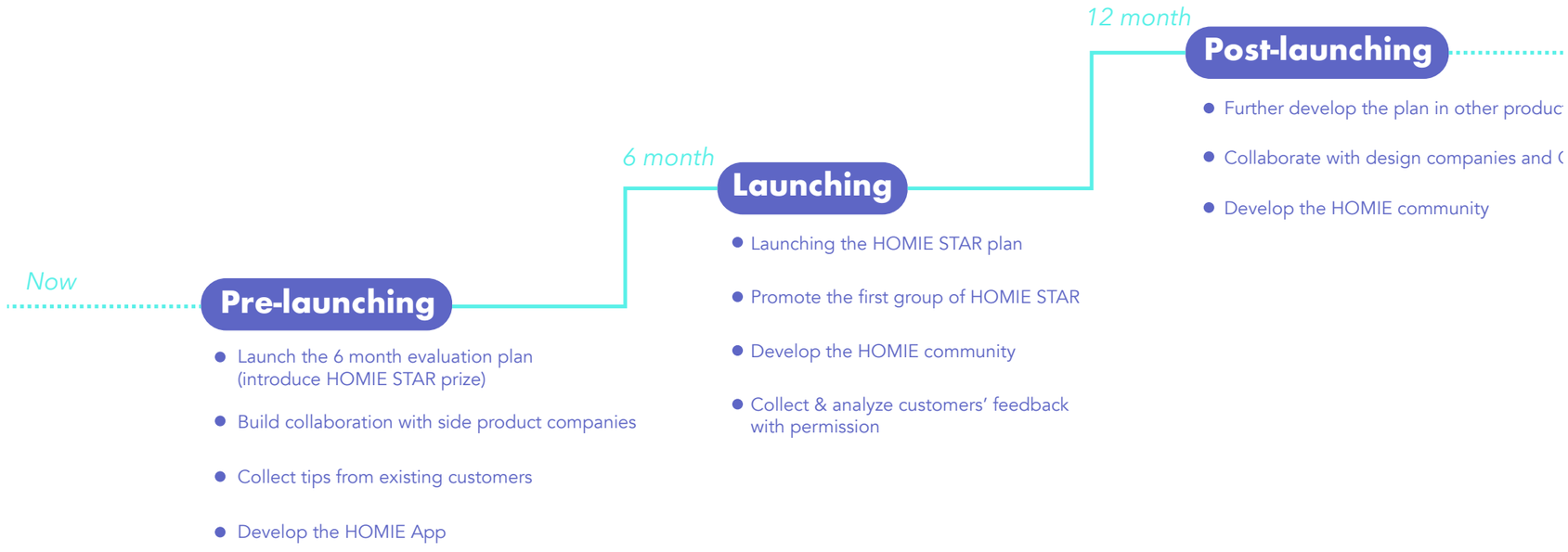


Figure 46. Key implementation steps over time

8.7 Conclusion

This chapter presented the final concept of encouraging and supporting HOMIE users to perform sustainable dryer use behaviours. The concept needs to be tested with HOMIE users to get better insights into potential challenges in future implementation. Therefore, the next chapter will present the concept validation.

Takeaways from this chapter

- The final concept is a service system based on a mobile app to involve, encourage and support HOMIE users to perform sustainable dryer use behaviours and live a pleasant life.
- The service has two phases to provide users sustainable dryer use behaviours knowledge and help users organize dryer use experiences, both in short-term and long-term: (1) Onboarding month mainly with 3 tasks; (2) Every 6-month HOMIE STAR evaluation.
- The service makes use of the motivation, ability and triggers to ensure the user takes the action to change dryer use behaviours. The influencing factors are generated from customer research and literature review, which mainly target on offering easy and on-demand support, real-time triggers and goal setting.

Validation

Validation

This chapter will present the evaluation and validation of the final concept with dryer users(both general users and HOMIE customers) and two HOMIE employees. Then, an overall evaluation of the HOMIE STAR plan will be evaluated in terms of its desirability, feasibility, and viability. Based on the validation insights, the final solution will be optimized.

9.1 Validation Interviews

The HOMIE STAR plan contains various service patterns and intervention factors. Validation of the overall strategy is needed to test if the HOMIE STAR strategy is meaningful for customers in sustainable dryer use and to identify the potential problem in future implementation. For the validation, dryer users and staff from HOMIE were invited to share their opinions on the final concept.

9.1.1 Method

To get the view on the final concept from different perspectives(as identified in *Chapter 6*), 7 interviews were conducted with dryer users, of which 2 are HOMIE's existing dryer customers and 5 are general dryer users. Besides, 2 additional interviews were done with HOMIE employees. The interviews last for approximately 30 minutes via Zoom. Then, the quotes will be analyzed with the thematic analyzing method.

Sampling

As the main target group of the final concept is young urban people who are busy from daily work but still want to live a pleasant life, the selected general dryer users are all employed and living in the city with different household sizes. Besides, two of the experts from HOMIE were available to participate in the evaluation interviews.

The demographics of the participants interviewed are shown in the Table below:

	Participant	Household size	Other notes
General dryer users	P1	1	Private dryer user
	P2	1	Private dryer user
	P3	1	Private dryer user
	P4	2	Private dryer user
	P5	2	Private dryer user, have pets
HOMIE dryer users	H1	2	Private dryer user
	H2	1	Private dryer user

	Participant
HOMIE Staff	Marketing & Communication Expert
	Co-Founder & CEO

Table 5. Participants

9.1.2 Procedure

The interviews were conducted online via Zoom. Each interview lasted for around 30 minutes. For dryer users and HOMIE staff, there were different procedures. All interviews were recorded with participants' permission for analysis.

Dryer users

The interviews with dryer users contain the future vision of the entire experience within the HOMIE STAR plan. The participants first went through the storyboard which shows how they would be served and supported by HOMIE to live a pleasant and sustainable life. Then they will be asked questions followed by the topics below:

1. *Are you willing to participate in this service? Why/why not?*

2. *Do you think the service is efficient in stimulating and supporting your sustainable dryer use behaviours?*

3. *What is your overall opinion of the concept? Which functions do you like/dislike?*

HOMIE employees

The interviews with employees have a similar procedure with the interviews with dryer users. After going through the storyboard, the participants will be asked questions as follows:

1. *What is your overall opinion of the concept? What are your suggestions for further improvement?*

2. *Are you willing to implement this service, why/ why not?*

9.1.3 Insights from dryer users

1. The new service is attractive

For general dryer users, although price factor is still the first priority in choosing a dryer, the HOMIE STAR service is attractive and can be an important considering factor when they choose/switch to the HOMIE pay-per-use dryer. The rewarding system, onboarding service and HOMIE Planner are considered the most attractive features in the HOMIE STAR plan.

> *"I think it can attract young urban professionals like me. Especially for the remote control thing and time management."*
>
> ---- *P1*

> *"It's high quality, it has rewards, so why not choose this...and because of the rewards I don't think it needs too much effort."*
>
> ----- *P2*

> *"Although using the app seems more work for me, the Planner saves my effort in real use. I'm not that into rewards actually, but I think it is important that you emphasize the value, so I think the keywords 'sustainability' and 'pleasant life' touched me."*
>
> ----- *P3*

> *"If there are these things like collecting credits and automatic price calculation, I will choose this kind of service. Because compared to buying, I can get some extra fun things or coupons."*
>
> ----- *P4*

> *"And if that[follow the recommendations on the Planner] happens and the app gives me a free voucher...the app rewards me those behaviours...That will be meaningful."*
>
> ----- *P5*

Besides, the HOMIE STAR service is considered novel so that raises people's curiosity to try it out. It is worthy to note that here the flexible contract also plays an important role in purchase decision making. This indicates that the new strategy fits the original value proposition well.

> *"It's a new service, so I think I will try it."*
>
> ----- *P2*

These validate that the new HOMIE STAR plan can attract more potential customers, especially the main target----young urban professionals who want to live a pleasant and sustainable life. As for the willingness-to-pay, some participants showed a positive attitude to choose the HOMIE pay-per-use dryer rather than renting and buying one. This validates that with the new service, HOMIE can be more competitive in the market. Furthermore, participants mentioned that they still value the quality of use more than being sustainable, which fits the value proposition that HOMIE needs to offer a supportive service to enhance experience satisfaction. This also suggests that HOMIE should first emphasize "to live a high quality and pleasant life" in the launching phase.

2. The HOMIE Planner is helpful in enhancing the quality of use

All user participants mentioned that the Planner is a key service which brings them big value and can make their lives easier. Here the Planner acts as a decision-maker who can save their mental effort of organizing laundry and choosing dryer settings.

"I really like your Planner, which is definitely helpful, especially syncing with my calendar, that's really really good."

---- H1

"The planner is nice that it can remind me to dry my laundry since I always forget."

---- P1

"I am always afraid that the laundry can't be completely dried, so I really like the recommendations [in the Planner]. Because it saves time. And I won't get up in the morning and find that my clothes are still moist. I feel awful when it happens... and the dryer is noisy when I'm sleeping. So it will be nice if it can notify me to wash and dry my clothes in advance."

---- P3

"Because it[HOMIE Planner] saves my time to think about how I can save energy. It decides for me and makes the best plan. So I will definitely choose this one[HOMIE pay-per-use dryer]."

---- P5

Additionally, participants find it is important that the Planner can sync to their personal calendar:

"It[HOMIE Planner] syncs with something like google calendar, so that stuff is the most important reason that I would install the app, and the onboarding instruction is another reason."

---- P5

"Because I really like the idea that you can sync it with your calendar, that you can be more organized."

---- H1

Although some participants didn' express interest in the remote progress checking, other participants showed a positive attitude to this function:

"Because right now, if I want to step out, I have to go and run quickly 'oh how much time it's left, maybe[it shows] one hour, okay, let's wait for one hour.' So now you can see on the app, that's good."

---- H1

These validate the usability of the HOMIE Planner. Furthermore, because general users use various dryers with different functions, they have different opinions on some functions in the HOMIE STAR program (such as remote progress checking). In this regard, because the existing customers of HOMIE are those who actually use HOMIE dryers, their opinions will be more robust. These features in the new service which are not currently attractive to potential users will be found valuable in the real experience of using HOMIE dryers. Therefore, their main benefit is to improve user adhesion.

3. The HOMIE STAR plan can stimulate sustainable dryer use behaviours

The supportive service, tools and rewarding system are considered helpful in stimulating sustainable dryer use behaviours and forming habits.

"It targets all the possible problems I would have."

---- P1

"If there is a planner that can be arranged in advance, then I will definitely give priority to the ECO mode, because I am relatively not so in a hurry. And I will develop a habit of choosing ECO directly when I am not in a hurry...and if there is such a function[rewarding system] that can collect points, then I will think about ECO mode as the first choice."

---- P4

One participant mentioned that the Planner can help reduce his frequency of use:

"I kinda feel that I'll use the planner for the long-term. I would prefer that the Planner can help me to get a better idea that every time I should put a lot of clothes instead of a small bunch of clothes into the machine...so that saves energy."

---- P5

Furthermore, one participant expressed that the onboarding tasks and monthly evaluation bring a sense of gamification in learning how to choose sustainable settings:

"It's like playing a game to match the goals. I think it is an interesting challenge. And at the same time, I can also know which modes are appropriate in a certain situation...or at different times. I really like this."

---- P3

4. Community and tips are helpful

Participants showed big interest in the community and the potential tips they can get from HOMIE and other users:

"So for example I really hate the cleaning of the filter of the dryer, so I can also have some convenient tips."

---- P3

"I also like the community, where you can ask questions without feeling that you have to reach the customer board etc. that will be really quick. and it's good to have the tips from other people."

---- H1

On the one hand, these suggest that *Task2-Know dryer settings* needs to be more interesting and easy for users to go through. On the other hand, these validate the importance of the Planner in stimulating sustainable dryer use behaviour. Furthermore, since time is an important influencing factor in performing sustainable dryer use behaviours(*Chapter 4*), letting users be aware of the relationship between time and load is important and can help raise users' interest in making use of the Planner.

6. App as a communication channel.

Participants agreed that the mobile app is an ideal communication channel for the new service. One participant explained:

"So anyone can get notified with his/her Apple Watch, iPhone, Android phone...that's good..."

---- P5

"And I'm really excited by the app, I really miss it. because now you have to go on the website..."

---- H1

This validates the importance of applying a mobile app as a communication channel for sharing information and providing support.

9.1.4 Insights from HOMIE employees

In general, HOMIE shows a positive attitude to implement the HOMIE STAR plan as the new service reaches the goal of stimulating sustainable consuming behaviours:

"I would implement [the HOMIE STAR service]. I like that you use the first free month to encourage the users to learn the things in different ways, try to figure out what are the pros and cons of the machine, and give them incentives to use the programmes which are energy efficient but they may won't directly use. And you found a way to give the people engaged over a longer period of time."

---- Co-Founder & CEO at HOMIE

Although the new service is desirable, experts from HOMIE explained that the HOMIE STAR would take time and effort to implement all of it, especially for the functions such as the Planner. Therefore, they would prefer to implement the service in the future. However, some functions in

the new service can be first implemented within the existing communication channels. This validates the feasibility of the first implementaion phase, which suggests the launching of community and ECO credits.

> *"I think the easiest thing to implement right away is the community. Because building an app takes time and the machine isn't that smart. But the community is something that we can do now."*
>
> *---- Marketing & Communication Expert at HOMIE*

Furthermore, the new service gives inspirations for the launching of the HOMIE App and has the possibility to be applied to other HOMIE products:

> *"I'd love to use this as an example when we talk about the further development of the HOMIE App. Maybe the basic HOMIE App we will use a little bit, yes, I think that's where we...this gives great ideas on what we can play around it and how can we push people to be sustainable."*
>
> *---- Co-Founder & CEO at HOMIE*

> *"... because we do want an app, so if we start building an app, I think we should take these things into account."*
>
> *---- Marketing & Communication Expert at HOMIE*

> *"I can see [it be used for] maybe for both washing machine and dryer, and for dishwasher as well. It's pretty cool if you can use it with all the HOMIE products."*
>
> *---- Marketing & Communication Expert at HOMIE*

9.1.5 Conclusion

Overall, the HOMIE STAR plan received positive feedback in terms of attracting the willingness to pay, enhancing the quality of use, and stimulating sustainable dryer use behaviours.

The HOMIE STAR plan enhances the willingness-to-pay among potential customers. And users are willing to make use of the new service and tools to achieve a higher quality of use and sustainability, which validates the usability and desirability of the concept. The rewarding system plays a vital role in attracting new customers who concern the financial factor in making purchase decisions. While the supportive service and tools on the HOMIE App, especially the Planner and community, will become the most crucial feature in performing sustainable behaviours in daily dryer use experience.

As for the implementation suggestions, the rewarding system and community are validated to be the first-to-implement service patterns and can start to make impacts on encouraging sustainable dryer use behaviours and collect feedback for further optimization. Although HOMIE doubts the implementation of the HOMIE Planner because of investment and the current limited number of customers, the Planner shows a strong attractiveness among both potential and existing customers. Thus, it is recommended to implement the HOMIE Planner in the future development of the HOMIE App.

The validation feedback also showed some improvement suggestions to the final concept. The quick improvements will be presented in *Chapter 9.3*, while recommendations for future directions are concluded in *Chapter 10.2*.

> ***Because it saves my time, it makes me green, it saves my life.***
>
> *—— P5, general dryer user*

> ***I was considering buying a new machine till militating my contract[with HOMIE]. But after your presentation, I'm definetely not going to do that.***
>
> *—— H2, HOMIE dryer customer*

9.2 Evaluation in three aspects

At the beginning of this thesis, I set the design goal as "To design a strategic service solution that is desirable, feasible, and viable, and can achieve business value, customer satisfaction, and sustainability'. In *Chapter 6*, I developed this goal into the design requirements. Therefore, it is essential to reflect on the design process and evaluate the HOMIE STAR strategy by three aspects: desirability, feasibility and viability. For each aspect, the key points are presented by linking back the research insights and evaluation sessions.

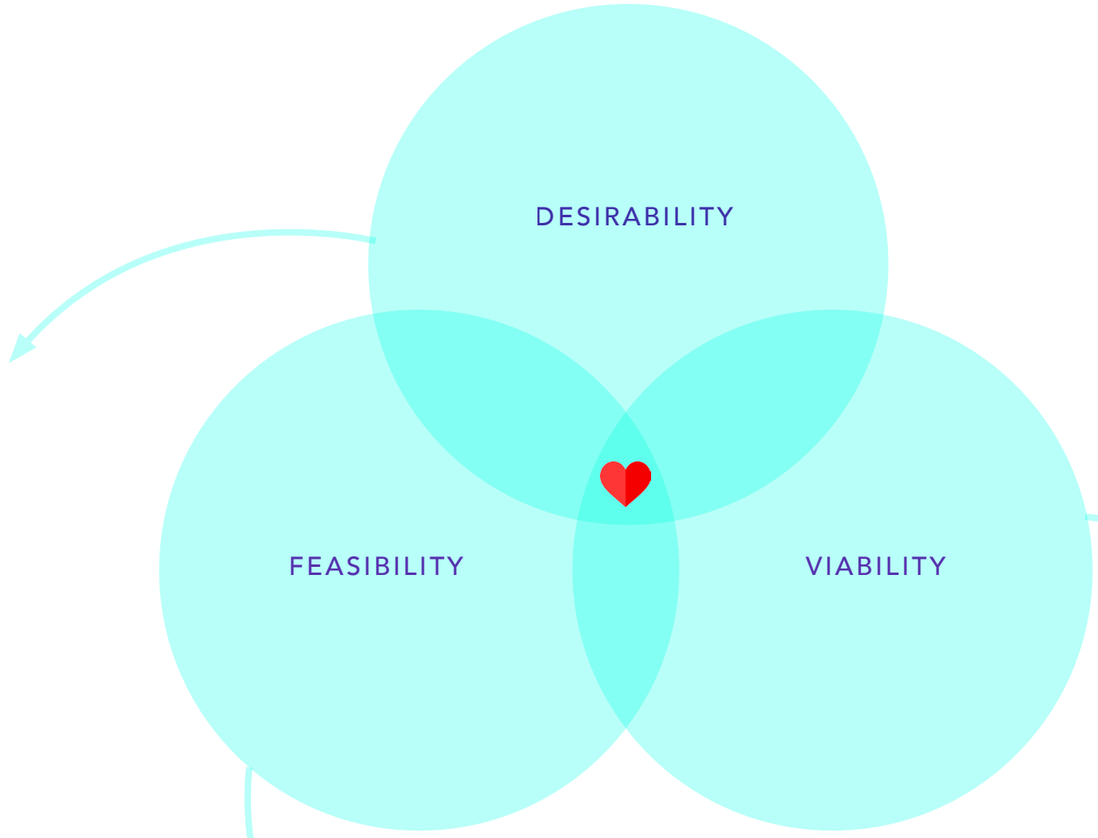
Desirability - do they want it?

The strategy meets the need for customers, environments and business in terms of sustainable dryer use service and experience.

Both general dryer users and HOMIE dryer customers mentioned that they appreciate the value of the HOMIE STAR service in terms of dryer use experience, sustainability and daily life. Especially for the HOMIE Planner and the rewarding system, users feel empowered and encouraged to participate in sustainable dryer use in the long-term. Moreover, users are attracted to take pay-per-use dryers instead of buying one, which enhances HOMIE's sustainable goal of prolonging the durability of the household appliances(*Chapter 3*).

During the evaluation sessions with HOMIE, the company appreciated the solution of making use of the free month for educating users to use more ECO settings. Besides, the community strategy matches HOMIE's positioning as one of the employees mentioned in the evaluation interview:

> *"I also love the idea of the community. That's really HOMIE like, you do it together, and help, so..."*



Viability - can they generate profit from it?

A larger group of customers and new collaborations will generate more profit for HOMIE.

The strategy brings HOMIE a competitive feature in the market and can help the company to attract more customers. During the final evaluation interviews with general dryer users, the participants show a positive attitude towards the new service, which indicates a higher willingness to pay. The HOMIE Planner and ECO credits strategy are not only considered meaningful in stimulating higher use percentage of the ECO mode but also plays a vital role in attracting new customers to choose HOMIE rather than other market competitors.

Furthermore, users show the willingness to sharing tips and their usage preferences. So HOMIE can build up the community as a next step, and share user feedback with product design companies and OEMs and generate profit from collaboration.

Feasibility - are they able to do it?

The proposed strategy doesn't require novel technology. However, the investment in developing the app is still a barrier since HOMIE did not have an app yet and is currently focusing on the investment in other ICT(*Chapter 3*). Therefore, the implementation suggestion is valuable for guiding HOMIE to implement elements gradually. Additionally, as the consideration of user feedback is increasingly important for OEMs to stay competitive(Zapfl, 2019), future collaboration with manufacturers and design companies is feasible.

9.3 Concept optimization

Based on the validation and evaluation results, some optimization of the final solution can be made.

Attract customers:

Optimized the promoting channel to attract existing customers.

Original:
- the company website(home page & account page)
- monthly emails.

Add: **+** Facebook groups, Twitter, and other social media accounts of HOMIE

"For me it[Facebook] is the most frequent social media I would use and I think it's good for informing people of anything. "

---- H2

HOMIE Planner:

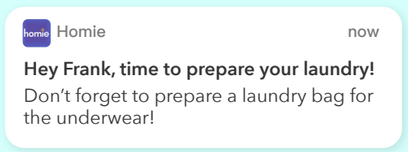
Optimized the content of preparation notifications.

Original:
- Time to prepare to laundry
- Planned load of the laundry

Add: Recommendation such as preparing laundry bags, etc.

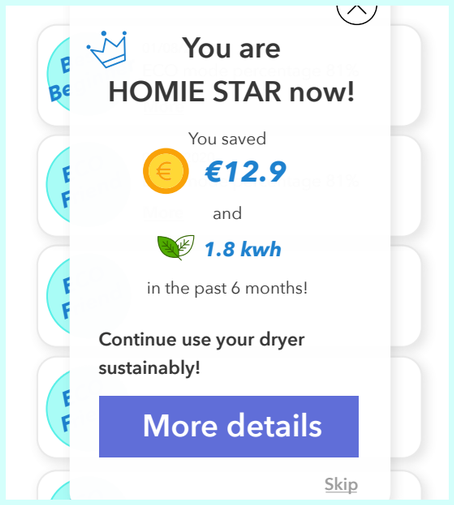
"I would suppose more tips, such as whether and how to deal with the special materials, or something about the laundry bag."

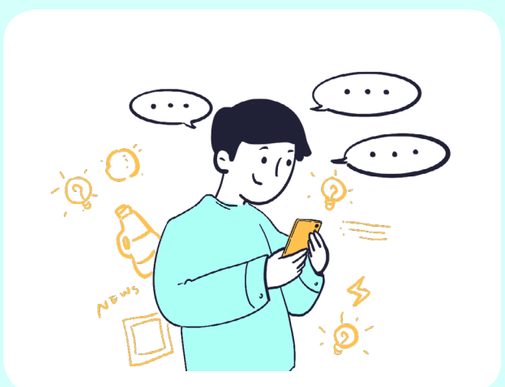
---- P2



Every 6-month evaluation:

Add: The monthly intervention feedback and 6-month evaluation should involve a conclusion of how much the user have saved. An example is shown below.





Community:

First implementation: Besides collecting tips and feedback via emails, HOMIE can start the community with a Facebook group for updates, quick Q&A and general tips sharing. However, this solution can not reach all customers of HOMIE since not everyone is an active Facebook user. Besides, it will be hard for HOMIE to track the ECO credits for information sharing of each user. Hence, the community of Facebook group can only be a first implementation option with limited effect. HOMIE still needs to establish its own community on the HOMIE App to realize more functions.

Discussion & Recommendations

10.1 Conclusion

The goal of this thesis was *to figure out the influencing factors in dryer use experiences* and *investigate how to persuade the users to use a pay-per-use dryer more sustainably*.

The research started with investigating and concluding key influencing factors in accepting and performing sustainable dryer use behaviours by literature study and customer interviews. Meanwhile, the research answered two specific questions in terms of the effect of different price strategies on stimulating sustainable dryer use behaviours. Finally, this thesis proposes a service strategy solution that benefits sustainability, customer experience, and business, thereby persuading users to accept and perform the required actions.

Furthermore, this thesis adds to the existing studies by concluding the influencing factors in a behaviour model. Together with insights from previous studies, this thesis brings a more comprehensive understanding of what service suppliers need to consider in the practical development of service strategy in promoting sustainable use behaviours in the dryer industry. The thesis also adds both customer and company perspectives related to the promotion of dryer usage habits from the perspective of PSSs.

10.1.1 Answer to research questions:

Research question 1

? *What are the influencing factors in sustainable dryer use experiences?*

Based on the findings from literature and customer interviews, customers can be stimulated by financial motivations, environmental concerns, service satisfactions to consider performing sustainable dryer experiences. Real-time triggers can encourage customers to act sustainable behaviours. However, ability factors play a fundamentally important role in performing sustainable actions, especially for dryer users, as one key reason why customers use a dryer is convenience. The young urban professionals thus become the main target of behaviour change since they have an increasing awareness of sustainability, open to new service and pay-per-use model, and want to achieve a higher quality of life in busy daily work. Therefore, the research suggests offering supportive service for saving mental/physical effort and time during the dryer use process.

Research question 2

? *Which pricing strategy is most successful in stimulating sustainable behaviours?*

Based on the usage data analysis in *Chapter 5*, paying per use can help customers to reduce their frequency of use. However, the various price strategy doesn't have a significant effect on lowering dryness levels nor enhancing ECO mode use percentages compared to fixed-price strategy. Pricing strategies need to be supported by other services to stimulate sustainable dryer use behaviours significantly.

Research question 3

? *Which strategy is most acceptable to different customer segments(i.e. Customers with different household sizes)?*

Usage data analysis also investigated that the impact of different pricing strategies on sustainable behaviours does not have a significant difference in different household sizes. Nevertheless, the frequency of use raises when the household sizes get bigger. Pets and kids will also lead to additional use, which matches the findings of the use frequency of washing machines identified by Kobus et al.(2013).

10.1.2 Answer to the goal of thesis:

By answering research questions and researching the company and the dryer service industry, this article proposes some design opportunities and designs a service strategy: the HOMIE STAR program. This strategy uses the influencing factors summarized in the research to help HOMIE persuade users to use dryers sustainably, and at the same time improve HOMIE's customer satisfaction so that HOMIE can realize its service value on a larger scale and for longer-term. At the same time, this strategy can also be developed and applied to other HOMIE products.

The validation interviews with users and HOMIE proved that the service strategy is valuable to be implemented and can help HOMIE to achieve a more sustainable dryer industry. Some service features can be implemented soon and can contribute to stimulating sustainable dryer use behaviours. Besides, the strategy involves channels for collecting customer feedback, which can help HOMIE to keep optimizing their service in the longer term.

10.2 Recommendations

10.2.1 For HOMIE

1. Quick improvements in current communication channels

The final solution mainly focused on the intervention through the new communication channels such as the mobile app. Nevertheless, based on research insights(*Chapter 2, 4, 5*), HOMIE can first integrate some features from the HOMIE STAR plan into its existing communication channels.

In addition to what already suggested in the implementation suggestions (*Chapter 8.6*) for the Pre-launching phase, HOMIE can start to add more content to current interventions. For instance, HOMIE should show how much cost the customer has saved because of their sustainable behaviours(low dryness levels, use of ECO mode) within the monthly emails and the account page on HOMIE website. The comparison with other HOMIE customers should also involve money cost.

Additionally, HOMIE can provide more understandable instructions for users to have a preview of different programmes. For instance, HOMIE can offer an interactive programme selector with a show of dryer dashboard on its webpage. This preview can be developed based on the dryness level selector that HOMIE already has on its webpage.

> *"I really appreciate that preview of the dryer that you have shown on the app[Task 2-Know dryer settings]. I can actually see on the app what does that mean. Because when I see those lights[on the dryer dashboard] blinking, I have to figure out[what is happening], and initially I couldn't figure out. And I'm too lazy to refer to the [original] manual."*
>
> ---- *H1*

Furthermore, HOMIE can integrate a live chat inbox on its website as an on-demand communication tool to quickly answer questions and provide more specific tips for users.

2. Development of the HOMIE Planner

The HOMIE Planner can be more connected to customers' daily life and habits. One suggestion is first to ask users for their habit and preferences when first login the App, such as their regular activities or the things they want to use the dryer for. The Planner can then remind the users to make a plan and do their laundry. Another suggestion is to show the laundry history in users' calendars so that the users can be more aware of their frequency of use. Another future direction of the Planner is to use AI for managing users' outfits(like a digital wardrobe). This direction will mainly attract young urban professionals who are fond of fashion or social activities.

3. Social media

The special prize of HOMIE STAR can also include a digital certificate of sustainable achievements that the users can show off on social media such as Instagram, Twitter, or Facebook, etc. This kind of social comparison has the opportunity to encourage sustainable behaviours and make use of customers' social network for advertisement. However, this idea needs further validation with users for making sure their willingness to share such information.

4. Special price packages on different household sizes

Chapter 4 & 5 found out that the dryer use frequency raises with the size of households, especially for the customers who have kids. To attract more young urban families who are more dependent on the dryer, HOMIE can introduce special price and service packages for this group of customers. For instance, customers with kids can buy a monthly package of ECO cycles with discount. The setting of the package can be inspired by the average frequency of use(According to findings in Chapter 5, the average monthly use frequency of customers with household size >=3 is around 14).

10.2.2 For future research & design

1. Research on share (house) dryer users

This project mainly focused on individual dryer users. Future research can explore the special need and concerns of shared house dryer users. The features of HOMIE STAR service, especially the Planner, can be developed and adapted to the shared house(dryer) model.

2. Research on season change and larger scale of users

Due to the limited time of this thesis, the research only involved the usage data in 5 months of 48 customers. Therefore, influencing factors such as seasons are not addressed in this study. Alborzi, Schmitz, and Stamminger(2017) investigated that most European users will change their dryer use frequency in different seasons (but also depends on other socio-demographic factors such as the countries the users live in). Hence, future research and design should take the season factor into account.

3. Validation with stakeholder insights

Future research should also do expert interviews to get insights into the needs of sustainable product development from the perspectives of OEMs and design companies. By investigating the specific needs and concerns of these stakeholders in the white goods industry, the optimized service and supply chain can be more concrete and make a more significant influence on the dryer industry.

4. Consideration of other household members

In multi-member households, laundry drying activities are usually not done by one user. Different users have various needs and preferences, which leads to the different levels of effectiveness of the same service on sustainable behaviour change. Kobus et al. (2013) also pointed out that smart household appliances should attract different target groups in one household. Due to the limited scope of this thesis, the preferences of different target groups have not been much involved in the research and solution. As such, the subsequent research needs to consider the preferences of different users.

5. Dryer Use Behaviour Model as an inspiration

This thesis concludes a behaviour model of sustainable dryer use in *Chapter 6.1*, which shows the specific influencing factors of sustainable dryer use behaviours. The design of the final solution makes use of these motivations, abilities, and triggers, which can serve as a case study to inspire other dryer-related services.

Future design can use this behaviour model as a reference to develop services and strategies for attracting and persuading customers to perform sustainable dryer use behaviours.

10.3 Self reflection

I can still remember the feeling when I saw the project brief and got to know HOMIE. Half a year ago, I was about to finish all the courses in Strategic Product Design and got a more in-depth insight in creating customer experiences from my internship as a creative UX designer. I read one book about persuasion and took a course about sustainable product design strategy. So I was really impressed by the way that HOMIE approaches sustainable consumption behaviours. I felt this project would be an excellent opportunity for me to apply what I learned into practice and gain more knowledge in terms of sustainable strategy design, and indeed it is.

During this project, I applied strategic research skills into real practice in investigating customer needs successfully and created strategic plans that benefit the environment, customer, and business. I learned a lot about behaviour change and product-service systems, both theoretical and practical. I enjoyed exploring opportunities by connecting my research findings of trends, customer needs, company capability and resources, and theory. I also enjoyed validating my assumptions and concepts with stakeholders and bringing perspectives together.

I am also glad that I have considered "persuading customers to accept new services" in the design process. This is also my original intention of learning strategic product design, that to truly transform the design into a product that can be applied to the market.

HOMIE is a start-up company that has excellent positioning but limited resources. It was challenging to identify unique but viable opportunities for this company. But I am glad that I finally found a solution. For me, this is what a strategic designer should do, that consider the needs of all stakeholders, identify problems and relationships from complex information, making use of internal/ external resources, and explore solutions for present and future.

If I had the second chance to do this project, I would plan each step more flexibly and interview as many stakeholders (including OEMs and design companies) as possible. I would also apply more manners to come up with creative ideas with critical thinking when I had to work individually. In the past studies, I mostly worked in a team, but this graduation project allowed me to think and make decisions more independently, and also made me realize my shortcomings. I appreciate being able to take this opportunity to improve my weaknesses.

Finally, I hope that my findings and design can help HOMIE to achieve their sustainable vision more efficiently and clearly. I also hope that this service strategy can enable more users to participate in sustainable practices.

References

A

Accenture. (2019, October 16). New Global Research from Accenture Interactive Urges CMOs to Put People Before Data Collection to Deliver a Better Digital Advertising Experience. Retrieved March 3, 2020, from https://newsroom.accenture.com/news/new-global-research-from-accenture-interactive-urges-cmos-to-put-people-before-data-collection-to-deliver-a-better-digital-advertising-experience.htm

Alborzi, F., Schmitz, A., & Stamminger, R. (2017). Effects of socio-demographic factors on laundry behaviours in Europe and their implications on sustainability. International Journal of Consumer Studies, 41(6), 671-684.

Armstrong, C. M., Niinimäki, K., Kujala, S., Karell, E., & Lang, C. (2015). Sustainable product-service systems for clothing: exploring consumer perceptions of consumption alternatives in Finland. Journal of Cleaner production, 97, 30-39.

Benefits of mobile apps. (2017, July 5). Retrieved June 1, 2020, from https://vividus.com.au/benefits-of-mobile-apps/#:~:text=Apps increase customer engagement&text=Businesses are using apps to,tool for the modern business.

B

Bocken, N., Boons, F., & Baldassarre, B. (2019). Sustainable business model experimentation by understanding ecologies of business models. Journal of cleaner production, 208, 1498-1512.

Bocken, N. M. P., Bom, C. A., & Lemstra, H. J. (2017). Business experiments as an approach to drive sustainable consumption: The case of homie. Delft University of Technology, 8, 10.

Bocken, N. M., Mugge, R., Bom, C. A., & Lemstra, H. J. (2018). Pay-per-use business models as a driver for sustainable consumption: Evidence from the case of HOMIE. Journal of Cleaner Production, 198, 498-510.

D

Design Council. (2019). What is the framework for innovation? Design Council's evolved Double Diamond. Retrieved February 18, 2020, from https://www.designcouncil.org.uk/news-opinion/design- process-what-double-diamond

E

Edbring, E. G., Lehner, M., & Mont, O. (2016). Exploring consumer attitudes to alternative models of consumption: motivations and barriers. Journal of Cleaner Production, 123, 5-15.

F

Fogg, B. J. (2009, April). A behavior model for persuasive design. In Proceedings of the 4th international Conference on Persuasive Technology (pp. 1-7).

G

GroupMap. (2017, August 30). Impact Effort Matrix Template, Action Priority Matrix. Retrieved June 21, 2020, from https://www.groupmap.com/map-templates/impact-effort-matrix/

I

IIT Institute of Design. (2010). Strategy Card [PDF file]. Retrieved from http://www.brainsbehavioranddesign.com/pdf/StrategyCards_BBDv1.0.pdf

K

KNOWARTH Technologies. (2018, February 9). 9 Advantages of Mobile Apps over responsive eCommerce websites. Retrieved June 2, 2020, from https://medium.com/@KNOWARTH/9-advantages-of-mobile-apps-over-responsive-ecommerce-websites-6aed1e6db0d8

Kobus, C. B., Mugge, R., & Schoormans, J. P. (2015). Long-term influence of the design of energy management systems on lowering household energy consumption. International Journal of Sustainable Engineering, 8(3), 173-185.

Kobus, C. B., Mugge, R., & Schoormans, J. P. (2013). Washing when the sun is shining! How users interact with a household energy management system. Ergonomics, 56(3), 451-462.

M

Marr, B. (2020, January 13). The 5 Biggest Smart Home Trends In 2020. Retrieved June 3, 2020, from https://www.forbes.com/sites/bernardmarr/2020/01/13/the-5-biggest-smart-home-trends-in-2020/#5c592b29389b

P

Patel, N. (2020, January 23). Marketing Trends for 2020: Here's What Will Happen That Nobody is Talking About. Retrieved March 6, 2020, from https://neilpatel.com/blog/marketing-trends/

Probs, L., Frideres, L., & Cambier, B. (2016). Servitisation pay-per-use. Business Innovation Observatory, European Commission.

T

Technologies, K. N. O. W. A. R. T. H. (2018, February 9). 9 Advantages of Mobile Apps over responsive eCommerce websites. Retrieved June 1, 2020, from https://medium.com/@KNOWARTH/9-advantages-of-mobile-apps-over-responsive-ecommerce-websites-6aed1e6db0d8

Top 3 Trends Impacting the Global Electric Dryers Market Through 2020: Technavio. (2016, September 8). Retrieved from https://www.businesswire.com/news/home/20160908006503/en/Top-3-Trends-Impacting-Global-Electric-Dryers

Tukker, A. (2015). Product services for a resource-efficient and circular economy–a review. Journal of cleaner production, 97, 76-91.

Tukker, A. (2004). Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet. Business strategy and the environment, 13(4), 246-260.

S

Sublime Technologies. (n.d.). Reasons Why You Need to Make your Home a Smart Home. Retrieved June 2, 2020, from http://sublimetech.

com.au/reasons-need-make-home-smart-home/#:~:text=Convenience: Having a smart home,turn their homes smart too.

SYZYGY. (2018, May 24). Technology-Driven Millennials Remain Narcissistic as They Age. Retrieved July 25, 2020, from https://ir.syzygy.net/global/en/news/syzygy-digital-insight-survey-2018-the-price-of-personal-data

V

Valencia, A., Mugge, R., Schoormans, J., & Schifferstein, H. (2015). The design of smart product-service systems (PSSs): An exploration of design characteristics. International Journal of Design, 9(1).

van Dam, S. S., Bakker, C. A., Hazenoot, T., & Mihelič, A. (2019). Co-creating circular product-service systems for long-lasting washing machines. In Plate Product Lifetimes And The Environment 2019: Conference Proceedings.

Y

Yarmosh, K. (2019, July 23). How Long Does it Take to Make an App? Retrieved June 27, 2020, from https://savvyapps.com/blog/how-long-does-it-take-to-make-an-app

Z

Zapfl, D. (2019, July 17). How suppliers can set themselves apart from the competition with innovations. Retrieved July 27, 2020, from https://www.lead-innovation.com/english-blog/suppliers-with-innovations

*

검증사이트 , & Froleprotrem. (n.d.). Business Model: Pay-Per-Use. Retrieved from https://reasonstreet.co/business-model-pay-per-use/

Thank you.