

GROWING BEYOND PRODUCTS

Designing a service-centric business model for an indoor gardening product

Master Thesis report
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PREFACE

When searching for a Dutch lifestyle brand to collaborate with for my graduation project, I hoped to find one whose approach to sustainability and design resonated with my values. Elho proved to be the perfect fit. I feel incredibly proud to have found a project that not only aligned with my interests but also fuelled my passion. This experience has been a rewarding journey of self-discovery, where I’ve learned more about who I want to be as a designer and where I can create meaningful impact. I’ve also become more aware of my strengths, areas for growth, and how to use these skills for positive change.

Looking ahead, I’m excited to continue applying the skills I have developed over the years to design for the future and create with purpose. Reflecting on my time in Delft, I feel fortunate for the personal and professional growth I’ve experienced. I look forward to building on this foundation and seeing where this journey leads next.

I want to thank Susie and Shahrokh, my mentor and chair, for their amazing guidance throughout this process. Susie, thank you for our many coffee chats, which often came with the supportive and uplifting words I needed. Shahrokh, your encouragement and practical insights helped me conquer my fear of academic research, it taught me a lot. Your open door and genuine interest in my success made all the difference and was truly appreciated. Also Bart, thank you for guiding me in the starting stages of the gradation journey.

I would also like to thank the design and innovation team at Elho. A special thanks to Robbert, my company mentor, for giving me the opportunity to work on this project for Elho. I’m grateful to have been welcomed so warmly by the team. Participating in daily meetings and learning from everyone was a pleasure. Celebrating Elho's 60th anniversary was the cherry on top. A big thank you as well to Bas, Gerard, Anne, Mattias, Fleur, Caroline, and Job for their support and insights.

Lastly, I am forever grateful to my family for their endless support throughout my journey at Delft. I would also like to extend a special thanks to the wonderful friends I have made in Delft, particularly at IDE. You have stood by my side through it all, making my time studying in Delft truly unforgettable.

Having said that, I present you with my thesis report.

Enjoy reading!

Teun van Wakeren

EXECUTIVE SUMMARY

This thesis explores the potential for elho Group to innovate in the indoor gardening industry by developing a Product-Service System (PSS). As a leader in sustainable synthetic plant pots, elho is eager to explore offerings beyond products that embrace a more service-oriented business. This thesis explores the intersection of consumer behaviour and strategic business model innovation, identifying key challenges, opportunities, and drivers that influence the adoption of new PSSs. Furthermore, it discusses how an understanding of these factors can inform strategic decision-making and future growth strategies.

The research and design process was structured using a systemic design approach, by using the Double Diamond model. Key activities included extensive literature reviews, empirical research on consumer behaviour, product testing, industry and competitor analysis, and several co-creation sessions. These activities helped identify the drivers and barriers influencing the adoption of PSS in the Indoor Smart Garden (ISG) market, offering valuable insights into consumer perceptions of current market offerings. The findings guided the development of a solution tailored to meet consumer needs while addressing existing gaps in the market.

Qualitative interviews with "zillennials" revealed key factors influencing PSS adoption. These included concerns around cost sensitivity, lack of flexibility, and lack of trust, as well as the importance of emotional benefits and service attributes. For ISG products, factors like aesthetics, customizability, and ease of use were critical for adoption. Participants favoured natural designs and products that seamlessly fit into their living spaces and reflect their personal values. The external analysis revealed a competitive landscape dominated by small, similar brands. Consumer dissatisfaction arises from poor product performance, high prices, and bad customer service.

The results indicate that launching an elho ISG PSS is a high-risk, all-in venture that demands full commitment and strong service differentiation. To stand out in the market, elho must provide a modular and customisable design that enhances interior compatibility while maintaining an affordable price point. Success also hinges on creating a PSS by focusing on lifestyle integration and high consumer interaction. Elho's future vision centres on becoming a trusted partner in plant care by integrating supporting services next to its products and evolving into a trusted partner in plant care through innovative, supporting consumers in their journey to a 'green' lifestyle with innovative, sustainable products and services that nurture both the user and their plants."

The proposed solution, Tuyn, empowers consumers to maintain and grow a range of home-delivered herbs effortlessly. With an automated watering system, AI-driven guidance, and a flexible offerings, Tuyn adapts to individual preferences, making indoor gardening both convenient and personal. The system is enhanced by a mobile application that provides customized plant care instructions, helping users seamlessly integrate their herbs into daily routines. With a customizable design, Tuyn fits perfectly into urban living spaces, offering both functionality and aesthetic appeal.

The expected impact of Tuyn is significant, improving consumer engagement and product differentiation. Tuyn addresses key consumer challenges identified in the research, including bad germination, long growth times, low yields, and complexity. The concept aligns with elho's purpose of "giving room to nature" and shifts towards a service-oriented model that enhances the consumer experience while allowing elho to explore a more direct Business-to-Consumer (B2C) approach.

The evaluation of Tuyn highlights its strong desirability for eco-conscious urban consumers seeking a unique and valuable experience, but challenges in supply chain management persist, particularly with elho's reluctance to deliver fresh herbs. The concept's feasibility is hindered by logistical complexities, while its viability depends on refining the business model and reducing operational costs. Recommendations include developing a robust supply chain, conducting pilot tests, adapting the business model with flexible pricing, creating strong branding, and launching an effective marketing campaign. Scalability through market expansion and potential vertical farming partnerships will also be crucial for long-term success.



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READING GUIDE

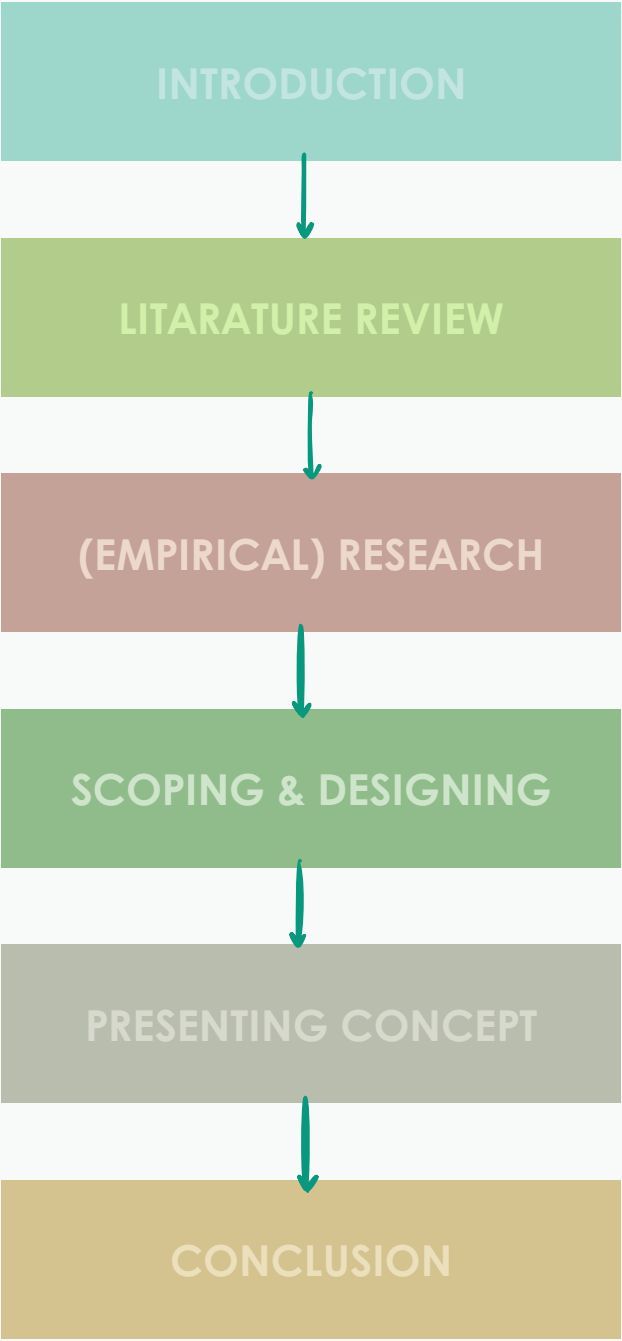
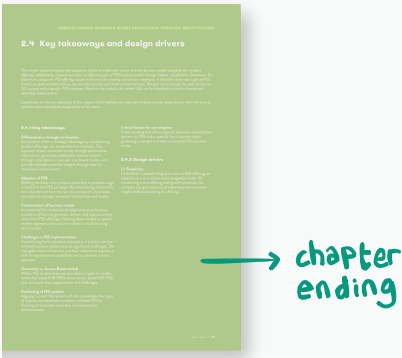
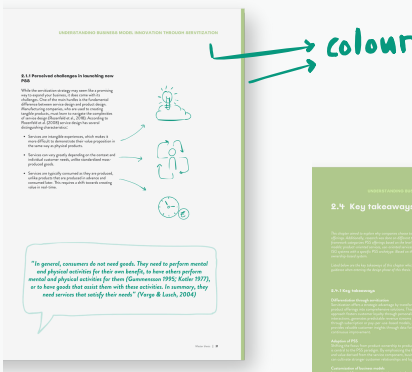
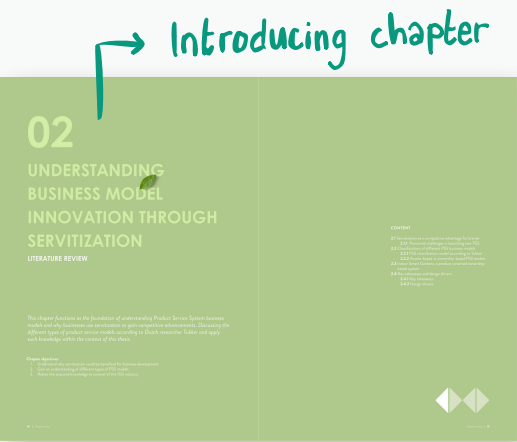
The purpose of this Reading Guide is to help you navigate through this thesis and enhance your understanding of each chapter included in the report.

As shown in the Table of Contents, the chapters are divided into six colour-coded sections. Each colour represents a specific part of the thesis.

At the beginning of each chapter, you'll find a two-page introduction outlining the chapter's focus and, in some cases, the objectives that were aimed for during the process as well as the content present in that chapter.

Throughout the chapters, coloured details on the right side of the page will help you easily locate which section you are in.

Finally, each chapter concludes with key takeaways and a list of design drivers to summarize the important points.



GLOSSARY

Product Service Systems (PSS):
A business model that combines products and services to deliver value to customers, where the focus is on the results or experiences rather than on the ownership of the product itself.

Indoor Gardening / Indoor Smart Gardens (ISG):
A system or method of growing plants inside the home, enhanced by technology that automates and optimizes plant care, such as watering, lighting, and monitoring through smart devices.

Customer (B2B retail partners of elho):
In this thesis, the term "customer" refers to organizations that partner with elho, such as retailers or distributors, who purchase elho products for resale or as part of their offerings.

Consumer (end users of elho products):
The end-user of a product, service or system.

Adoption factors and barriers:
Elements that positively or negatively influence (directly or indirectly) the willingness and intention of consumers to adopt a new product or service.

Urban dwellers:
Individuals living in urban areas.

Zillennials:
A micro-generation bridging Millennials and Gen Z.

Design Drivers:
Key principles or goals that guide the design process, ensuring that the product or service meets specific needs and preferences of end users.

Subscription Model:
A business model where consumers pay regularly (e.g., monthly or annually) to receive products or services.

01

INTRODUCTION



This chapter presents the research context, and introduces the background, problem statement, and purpose. It introduces the context of the indoor smart gardening industry. Additionally, this chapter introduces the client, the case company (i.e., elho), and outlines the design approach and process that was followed throughout the thesis project.

CONTENT

- 1.1 Introducing the research context
 - 1.1.1 An introduction to the Indoor Smart Garden industry and its potential for growth
 - 1.1.2 Servitization as a strategic move
 - 1.1.3 Adoption barriers towards novel PSS
- 1.2 Introducing the Client
 - 1.2.1 Project background
- 1.3 Project goal
- 1.4 Structuring the design process



1.1 Introducing the research context

1.1.1 An introduction to the indoor smart garden industry and its potential for growth

The indoor gardening sector has experienced a remarkable surge in recent years, through a combination of societal trends and a growing appreciation for the wide range of benefits that greenery offers in our homes (Maximize market research, 2024).

An Indoor Smart Garden (ISG) is a compact, self-contained indoor growing system. It typically features an integrated UV grow light, space for pre-seeded pods or soil and seeds, and a water reservoir with a level indicator. These gardens are ideal for individuals with limited space or time for traditional gardening, as they provide the necessary amount of light and nutrients for plant growth regardless of placement. ISGs are often connected to a smartphone application for water level alerts and additional care instructions, offering a convenient and accessible indoor gardening experience (Figure 2).

Several key factors have contributed to the growing interest in the indoor gardening phenomenon. The COVID-19 pandemic, with its emphasis on social distancing and work-from-home culture, amplified the consumer's desire for a connection with nature (Behe et al., 2022). Research of Behe et al. (2022) explore this generational shift, revealing that millennials (born 1981-1995) prioritized the social connection fostered by plants during isolation, particularly through online communities. Gen Z (born 1996-2012), on the other hand, valued the educational and physiological benefits associated with plant care. Both groups, however, demonstrate a growing value of being environmentally aware which is associated with having indoor plants as well as the focus on personal well-being, which is evident through their appreciation for the benefits of improved air quality, mood enhancement, and stress reduction associated with indoor plants (Aydogan & Cerone, 2021; Dzhambov et al., 2021). Caring for plants can also provide a sense of accomplishment and foster a connection to living things, particularly for urban dwellers yearning for a closer touch with nature (Bringslimark et al., 2009).

The rise in indoor gardening is particularly being explored among millennials (ages 18-35) (Tena-Monferrer & Fandos-Roig, 2024), with houseplants becoming a symbol of their values. Social media platforms like Instagram and TikTok act as a breeding ground for sharing plant care tips, showcasing curated "indoor jungles," and fostering a supportive online community for novice plant enthusiasts, ultimately contributing to the industry's overall growth (Bärlund, 2024).

As urbanization intensifies and living spaces shrink, the demand for creative solutions to incorporate nature within our homes is likely to rise. Technological advancements in

areas like smart irrigation systems and automated lighting offer opportunities for further growth and accessibility in indoor gardening (Yu and Sung, 2023a). Reflecting this significant growth potential, the global smart indoor garden market is valued at USD 122.75 million in 2022 and is projected to reach USD 225.70 million by 2029 (Maximize Market Research, 2023).

By harnessing the multi-faceted benefits of indoor plants while continually innovating, the indoor gardening sector is poised to blossom as well as it is maturing. The increasing urbanization and the desire for green living spaces further support this promising future (Maximize Market Research, 2023).



Figure 2: Click and Grow ISG (Click and Grow, 2019)

1.1.2 Servitization as a strategic move

In today's business landscape, companies are constantly seeking innovative ways to differentiate themselves and achieve a competitive edge. Traditionally, manufacturing companies focus on cost leadership, product differentiation, and operational excellence (Porter, 1985). Service industries, on the other hand, prioritize creating intangible value through experiences and expertise, service innovation, and adaptability (Gebauer et al., 2011; Stickdorn & Meinel, 2011). However, the lines are blurring, and products and services were merged leading to the emergence of

innovative business models known as Product-Service Systems (PSS). In the 1990's, the research field in PSS continued to develop various frameworks for identifying PSS models (Tukker & Tischner, 2006). The 'experience economy' that was brought in by the development of digital technology in the twenty-first century, has contributed to the expansion of PSS models.

Pereira et al. (2023) have identified six key drivers that influence businesses to adopt PSSs. These include environmental sustainability, gaining a competitive advantage, expanding and diversifying their portfolio, co-creation based on customer values, integrated solutions, and co-production. In their framework, Pereira et al. (2023) explore the relationships between these drivers at three levels: strategic, tactical, and operational (Figure 3).

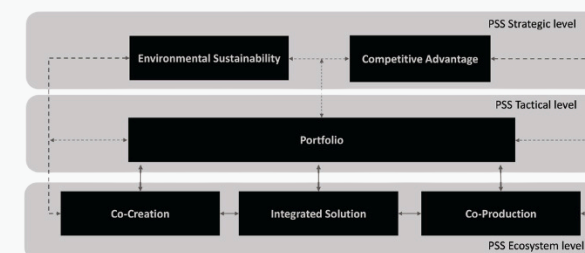


Figure 3: Drivers for Product/service-systems framework (Pereira et al., 2023)

Environmental sustainability stands out as the primary driver for companies adopting PSS models (Pereira et al.). These models enable businesses to easily incorporate eco-friendly practices and improve areas such as extending product lifecycles, recycling, and end-of-life solutions. Businesses across all industries are exploring innovative approaches through a strategy known as servitization.

Servitization refers to the strategic shift where companies move beyond selling products to offering a comprehensive solution that integrates services with their offerings (Smith et al., 2014). This creates additional value for both the customer and the firm by addressing specific customer needs.

1.1.3 Adoption barriers towards novel PSS

Understanding consumer adoption behaviour is beneficial from a business perspective for evaluating the potential success of novel products and services (Rogers, 2003). This thesis will investigate the barriers and motivations influencing consumer decisions to adopt ISG systems. By examining these factors, this thesis aims to provide valuable theoretical and practical insights into the challenges and opportunities within the indoor gardening industry. A

1.2 Introducing the Client

This thesis was made possible by the client of this project, elho Group. Elho is a Dutch family-owned company with a rich history dating back to 1948. They are known for their leading role in the synthetic plant pot industry and related products, mainly, in the European market. Beyond simply offering products, elho champions sustainability by being a frontrunner in environmentally friendly production and operation. All products are made from 100% recycled and recyclable materials, produced locally at their factory in Tilburg, the Netherlands that runs on 100% wind energy making them a proud certified B Corporation.

Through their purpose-driven approach of 'together we give room to nature,' elho is a company that seamlessly blends innovation and style through design while keeping nature and users in mind. Their products contribute to consumers' daily lives, fostering a connection with nature within homes, gardens and beyond. This focus on both environmental responsibility and user experience has solidified elho's position as a respected and influential brand within the global horticulture industry.

1.2.1 Project background

Elho is consistently searching for opportunities to fulfil its mission of bringing people and nature closer together. In pursuit of this goal, they actively seek out new business concepts that allow them to innovate and grow. Currently, elho operates under a business model centred around manufacturing and selling physical products, primarily through resellers.

Elho utilizes McKinsey's 3 Horizon Innovation Model (see Figure 4) to guide its growth strategy through different levels and types of innovation. This model showcases the potential value of innovations for the company in relation to the time required for implementation. The speed of innovation in the industry plays a significant role in determining the feasibility of incorporating these innovations. Horizon 1 Innovations concentrates on short-term projects that yield results within 1-3 years, focusing on maintaining and strengthening the core business. Horizon 2 projects, on the other hand, require a more extended development period and involve tapping into new or emerging industries to expand into adjacent spaces. Finally, horizon 3 innovations adopt a high-risk, high-reward approach, exploring disruptive innovations with radical business models that create entirely new markets or disrupt existing ones.

This thesis will examine an innovation classified as a Horizon 2/3 innovation. Elho Group is prepared to explore opportunities beyond its current product focus by investigating the potential of the previously discussed phenomenon of servitization. This includes the exploration

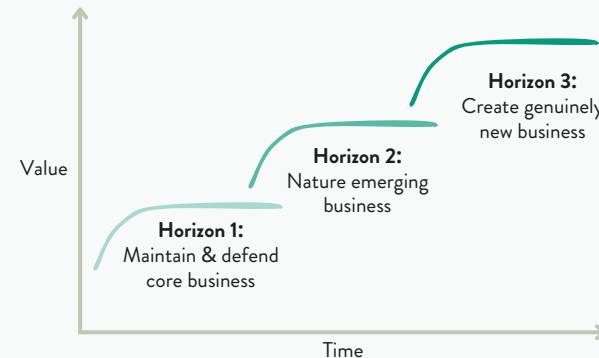


Figure 4: McKinsey's three Horizon Innovation Model

of a new PSS within the ISG industry.

Elho has observed significant growth within its 'Grow Your Own' product category, which caters to both indoor and outdoor gardening and harvesting. This growth serves as a primary motivator for targeting this area as an entry point for a PSS. The core of this new PSS will focus on an ISG product that enables consumers to easily and efficiently grow their own produce.

Elho aims to future-proof itself through innovative solutions that address the needs of future consumers and align with evolving trends. Integrating service design alongside product offerings could be a strategic step toward achieving this goal. However, implementing a PSS presents unique challenges as it involves a different business approach compared to elho's traditional models. Due to their limited experience with such models, elho is uncertain about the optimal strategy for this new business concept. Nonetheless, they are eager to determine if this concept could lay the groundwork for future innovations.



1.3 Project goal and research question

This thesis seeks to explore, identify and validate the potential of a PSS within the indoor gardening industry, with a particular emphasis on elho. The primary objective is to design a PSS that is feasible, desirable, and viable, enabling elho to advance its business through a Horizon 2/3 innovation concept.

The relevance of this project is twofold. Firstly, it examines the adoption behaviour of consumers (identifying determinants (factors) that directly or indirectly influence adoption decisions) when presented with innovative PSS models. Understanding these factors is crucial for ensuring the success of any new product service offering. Secondly, the project aims to enhance elho's positioning through strategic product diversification and differentiation based on what the market already has to offer within this industry. Launching into a new market requires a deep dive into the existing competition and an understanding of the specific market you are entering. The outcome of this thesis will support the company in this possible adoption and strategic shift towards new service-centred product offerings.

The main research question for this thesis will therefore be:

Successful PSS cater not only to a defined target group but also to their specific behaviours and needs. This thesis highlights the importance of studying consumer behaviour before introducing a new PSS. By analysing consumer behaviour and identifying influential factors that reflect the adoption rate towards new PSS, this thesis aims to provide valuable insights into how the target group behaves when making purchasing decisions and adopting new offerings. Such insights and knowledge allow to design a PSS that resonates with their values, addresses their pain points, and ultimately increases its chances of adoption and long-term success.

Ultimately, this thesis seeks to provide new insights and knowledge about PSS to elho. By bridging the gap between product and service, the goal is...

... to introduce a feasible, viable, and desirable PSS that caters to consumer needs, strengthens elho's brand identity, and fosters sustainable opportunities within the indoor gardening industry.

The outcome of this thesis can support elho in the potential adoption of a service-centred product offering, allowing them to explore future possibilities for the company.

Research questions

By exploring the intersection of consumer behaviour and strategic business model innovation, the following are the main research questions:

RQ 1: What are the key challenges, opportunities, and drivers that influence the adoption of a new product-service system in the indoor gardening sector offered for a purpose-driven brand?

RQ 2: How can an understanding of these factors result in strategic decision-making and future growth strategies?

1.4 Structuring the design process

After introducing the topic of this thesis, it is clear that a strategic approach is necessary to address the posed research questions and find the right answers and solutions. In strategic design, designers utilize specific principles, tools, and methods to develop or refine an innovation strategy (Calabretta et al., 2016). Strategic design integrates design principles into business strategy to drive innovation. It combines creative thinking and problem-solving to tackle complex challenges and generate long-term value (Calabretta et al., 2016).

Throughout this thesis, a structured design approach was followed to guide the project from start to finish. The primary method used was the Double Diamond model, a framework created by the Design Council in the United Kingdom in 2005 (Groeger & Schweitzer, 2014). The Double Diamond consists of two diamond-shaped phases that represent divergent and convergent thinking. These phases give support in exploring the problem context, generating ideas, and refining project directions and solutions. As shown in Figure 5, the framework is

divided into four distinct phases: Discover, Define, Develop, and Deliver. The points where the diamonds intersect indicate the convergence phases, where analysis and synthesis are carried out to define findings into actionable opportunities. This point is commonly referred to as the design focus and marks the transition from research insights to design solution.

This framework is well-suited for this project as it provides a clear overall structure throughout the entire process. By

combining the Double Diamond with other smaller design tools, methods, and theories, the approach facilitated thorough research and iterative design processes while fostering creativity and innovation (Binder, 2023). Figure 5 shows a visual representation of the double diamond method and how it has been applied within this thesis.

This graphic visually represents all the executed research and design activities for each stage of the double diamond, illustrating the process from start to finish.

Phase 1: Discover

Gain a deep understanding of the problem space, business model innovation methods, user needs, market trends, and business goals related to developing a product-service system (PSS) for product-driven brands.

Phase 3: Develop

Iterate on the business model, design the service, and its onboarding strategy based on design requirements retrieved from earlier phases. And validating this with stakeholders.

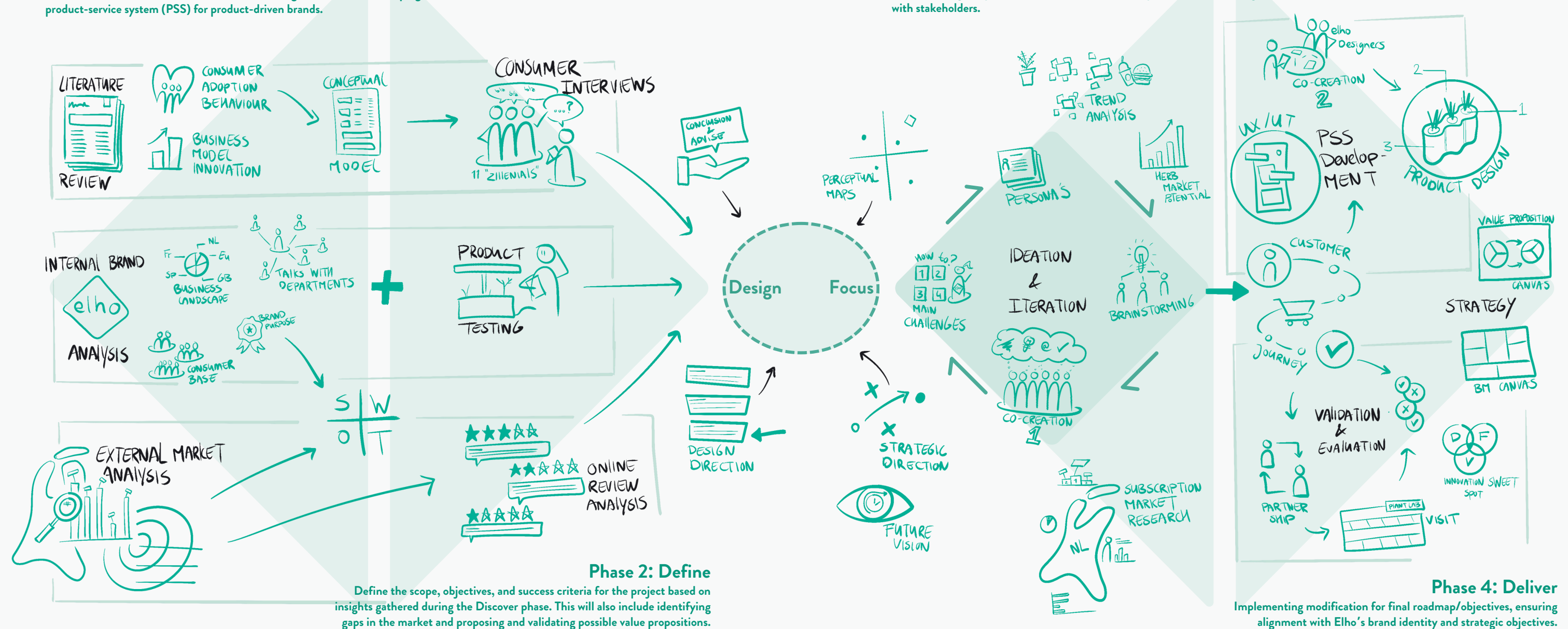


Figure 5: Design process including (design) activities

02

UNDERSTANDING BUSINESS MODEL INNOVATION THROUGH SERVITIZATION

LITERATURE REVIEW

This chapter functions as the foundation of understanding Product Service System business models and why businesses use servitization to gain competitive advancements. Discussing the different types of product service models according to Dutch researcher Tukker and apply such knowledge within the context of this thesis.

Chapter objectives:

1. Understand why servitization could be beneficial for business development
2. Gain an understanding of different types of PSS models
3. Relate the acquired knowledge to context of the ISG industry

CONTENT

- 2.1 Servitization as a competitive advantage for brands
 - 2.1.1 Perceived challenges in launching new PSS
- 2.2 Classifications of different PSS business models
 - 2.2.1 PSS classification model according to Tukker
 - 2.2.2 Access-based vs ownership-based PSS models
- 2.3 Indoor Smart Gardens, a product-oriented ownership-based system
- 2.4 Key takeaways and design drivers
 - 2.4.1 Key takeaways
 - 2.4.2 Design drivers



2.1 Servitization as a competitive advantage for brands

As mentioned in the introduction, servitization refers to the strategic shift where companies move beyond selling products to offering a comprehensive solution that integrates services with their offerings (Smith et al., 2014) which creates additional value for both the customer and the company by addressing specific customer needs.

There are several compelling reasons why servitization is gaining traction as a competitive advantage:

- **Product commoditization:** In many industries, products are becoming increasingly commoditized, making it difficult to stand out solely on product features. Servitization allows companies to differentiate themselves by focusing on the value proposition and experience associated with using the product (Ania Da Costa Fernandes et al., 2020).
- **Increased Customer Loyalty:** By offering services alongside products, companies can build stronger customer relationships. Services like maintenance, training, and use optimization foster trust and loyalty by demonstrating interest in the consumer's success (Elejaz et al., 2023).
- **Recurring Revenue Streams:** Servitization often involves subscription-based models or pay-per-use structures for services. This creates a predictable stream of recurring revenue, which can be more reliable than one-time product sales (Honore et al., 2022).
- **Enhanced Customer Insights:** Providing services allow companies to gather valuable data on consumer usage patterns, needs, experience, and feedback. This data can be used to continuously improve products and services, personalize offerings, and anticipate future customer needs (Gebauer et al., 2011). This is easier to be done, hence PSS are usually more flexible systems that can be adjusted more easily to a changing market. But it should be kept in mind that such approach requires a company to operate differently. This as a result contributed to loyalty and establishing a closer and longer relationships with consumers (Honore et al., 2022).

The results of servitization strategies has led to the Product Service System (PPS) that Tucker and Tischner (2006) defined as: "A PSS shifts the focus from selling products to selling the benefit derived from using a product. This can involve extending the life span of products, take-back and remanufacturing of used products, and offering a variety of services that are complementary to the product" (Tukker & Tischner, 2006). Although the term PPS does not have one specific definition, they are all seen as holistic business innovation strategies that include a service and a product that serve to specific customer needs and requirements (Waidelich et al., 2019).

Vargo and Lusch (2023) further argue that the focus has transitioned from a mere exchange of tangible goods to one centred on intangible resources, co-creation of value, and relationship building. Their paper traces this historical shift, highlighting the move away from goods-centric models towards knowledge, skills, and information as pillars of competitive advantage. Servitization, by its very nature, fosters this co-creation by focusing on the customer's experience and outcomes rather than simply selling them a product. The authors state, 'Although the output-based, goods-centred paradigm is compatible with deterministic models of moving things through spatial dimensions (e.g., distribution of goods), it is considerably less compatible with models of relationship' (p.13). They also agree that a competitive value proposition is created through an interactive relationship with consumers where the focus is steered towards value-creation in coproduction processes.

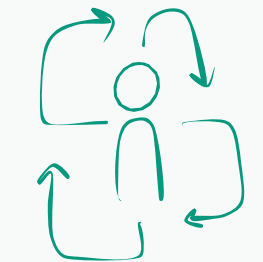
According to Reim et al. (2015), it is essential for companies to customize their business models in order to effectively generate, deliver, and capture value from their PSS offerings. This emphasizes the fact that successful PSS business models can vary significantly, as different companies can achieve different results by integrating service or product elements in their own distinctive ways (provide an example here). This helps to explain why some companies thrive in implementing PSS, while others face difficulties, even if they have similar strategies.

Apart from the characteristics of competitive advantage, its enduring value is also a critical factor. According to Annarelli et al. (2019), the long-term worth of competitive advantage is determined by the replicability and imitability of a firm's advantage. Replicability refers to how easily competitors can transfer or redeploy a firm's resources and capabilities. On the other hand, imitability focuses on the difficulty of directly copying a firm's distinctive advantage. These two components are relevant to all business models, not just PSS, and serve as important indicators of a competitive advantage's long-term viability (Annarelli et al., 2019).

2.1.1 Perceived challenges in launching new PSS

While the servitization strategy may seem like a promising way to expand your business, it does come with its challenges. One of the main hurdles is the fundamental difference between service design and product design. Manufacturing companies, who are used to creating tangible products, must learn to navigate the complexities of service design (Rozenfeld et al., 2018). According to Rozenfeld et al. (2008) service design has several distinguishing characteristics:

- Services are intangible experiences, which makes it more difficult to demonstrate their value proposition in the same way as physical products.
- Services can vary greatly depending on the context and individual customer needs, unlike standardized mass-produced goods.
- Services are typically consumed as they are produced, unlike products that are produced in advance and consumed later. This requires a shift towards creating value in real-time.



"In general, consumers do not need goods. They need to perform mental and physical activities for their own benefit, to have others perform mental and physical activities for them (Gummensson 1995; Kotler 1977), or to have goods that assist them with these activities. In summary, they need services that satisfy their needs" (Vargo & Lusch, 2004)

2.2 Classifications of different PSS business models

There have been a handful of researchers who created classification models for different types of PSS from the extensive list of existing literature on PSS. For example, Waidelich et al. (2019) have identified the five most acknowledged types of classification models from Mont (2002), Tukker (2004), Meier et al. (2005), Neely (2008) and, Gassmann et al. (2013). However, Waidelich et al. (2019) state that Tukkers’ classification model on PSS is generally accepted and widely acknowledged in the academic world.

2.2.1 PSS classification model according to Tukker

The classification model of Tukker (2004) identifies 8 archetypical models that fall into three core categories of PSS. In Figure 6A, Tukker sets PSS between pure product and pure service. In between, Tukker defines three PSS types. In addition to the use and result-oriented PSS already introduced in Monts’ model (2002), Tukker introduces the product-oriented PSS type.

- The first main category is the **Product-Oriented Services (POS)** model. Here, a company commits to delivering a service related to the provided product (Tukker & Tischner, 2006).
- The second main category is the **Use-Oriented Services (UOS)** model. Here, the product still plays a central role but stays in the ownership of the provider and is not geared towards selling this product. The product is being offered through rental, sharing, or leasing agreements. (Reim et al., 2015)
- The third main category is the **Result-Oriented Services (ROS)** model, the company offers the customer a certain result or outcome without a pre-determined product involved (Reim et al., 2015).

With product-oriented archetypes, the focus is on the sale of the product which is accompanied by services.[TW1]

1. **POS Product related:** Apart from product sales, customers are provided with supplementary services that are customized for the product and help guarantee its usage (Tukker, 2004).
2. **POS Advice and consultancy services:** To help the customer make the best use of the product, the supplier provides consulting services in addition to selling the product to optimize usage (Tukker, 2004).

While Tukker acknowledges that the product is still crucial to the benefit-oriented PSS, the user-oriented business model emphasizes the potential uses of the product rather than just selling it. The supplier maintains ownership of the product and offers it in various offering forms to various customer segments (Tukker 2004).

3. **UOS product lease:** The product is still owned by the supplier who oversees maintenance, servicing, repair, and inspection. So; for example, if the customer uses the product frequently, they will be charged a fee. The customer is given an unlimited opportunity to use the product on an individual basis in exchange (Tukker, 2004).
4. **UOS renting/sharing:** Comparable to the lease model, the provider owns the product while it is in use and is also responsible for servicing, maintenance, repair, and inspection. Likewise, the customer pays a fee to use the product. The main difference to leasing is that the customer’s use time is limited, and it is not restricted to a single individual. Put differently, other customers are allowed to use the same product at different times (Tukker, 2004).
5. **UOS pooling:** Again, this archetype is similar to the previous one, except that with pooling a product can be used equally and at the same time by different customers.

With result-oriented models, the focus is not on selling the product to a consumer the consumer is offered a certain result as a service.

6. **ROS activity management/outsourcing:** With this model, a part of an activity is delegated to a third party. Performance indicators are defined to guarantee a particular quality; these indicators are frequently contractual components.
7. **ROS pay-per-service unit:** The foundation of this model is that the customer is not required to buy the product, but a predefined performance is described, that must be paid for based on the level of use. The provider oversees all the tasks necessary to deliver the performance (Tukker, 2004).
8. **ROS Functional results:** The provider promises to give the customer a predetermined functional outcome. Reaching this desired outcome is the prime focus regardless of a product being involved (Tukker, 2004).

The final archetype (ROS functional results) shifts the focus from owning a product to delivering the desired outcome. This shift allows for more flexibility in meeting the customer's specific needs. However, defining and measuring abstract outcomes can be challenging for both the providers and customers, which could potentially hinder the evaluation of service delivery (Tukker, 2004).

2.2.2 Access-based vs ownership-based PSS models:

In Tukker’s classification model (see Figure 6A) all archetypes are placed between pure product and pure service with which the author distinct general types of business models: ownership-based PSS models (OB-PSS) which contain the pure product and POS models, and access-based PSS models (AB-PP) that include the UOS, ROS and pure service models.

OB-PSS models are the most basic models where the customer acquires full ownership of the product by purchasing it outright and it usually includes additional services that enhance its use or lifecycle. The focus is on full consumer ownership of the product whereas in AB-PSS models the focus shifts from selling products to providing access to the product’s functionalities through a fee without having to own the product (Tunn et al., 2021). Well-known examples of these types of models include subscriptions, pay-per-use, and product-sharing platforms. By extending the lifetime of the product and increasing its utilization the goals is to prevent planned obsolescence and reduce idle products (Tukker, 2004).

However, implementing AB-PSS within existing businesses is not without its challenges. Tunn et al. (2021), highlight that it requires a significant shift in how businesses operate and that this shift must be understood as business model innovation. While many innovative circular business models such as AB-PSS are emerging, it must be noted that consumer adoption can vary. These models may face different or higher adoption barriers compared to simply selling new products through ownership-based business models (Tunn et al., 2021).

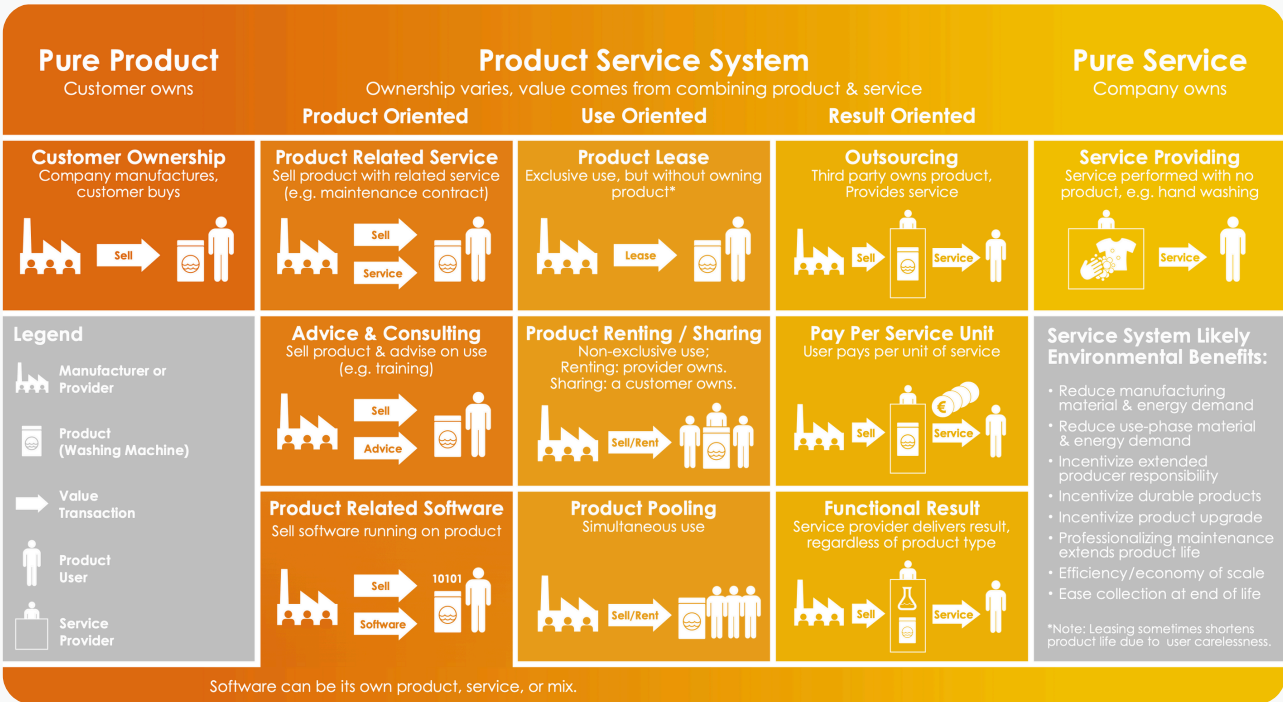


Figure 6A: Product Service System landscape classification according to Tukker (2004)

2.3 Indoor Smart Gardens, a product-oriented ownership-based system

This thesis explores PSS within the domain of indoor gardening, with a focus on ISG concepts that utilize subscription services on seed pods and connected applications. This focus aligns with the interest of elho. By analyzing this generalized concept through the lens of Tukker's PSS classification (Tukker & Tischner, 2006), the aim is to understand its positioning within the broader framework of service innovation and customer value creation.

Tukker's model classifies PSS models based on the value proposition they offer. Product-oriented systems concentrate on selling a product along with additional services that ensure its performance throughout its lifespan (Tukker & Tischner, 2006) (Figure 6B). In the case of the state-of-the-art ISG, the main product is the ISG appliance, which is owned by the consumer, and the subscription service for seed pods enhances this core offering. The subscription provides extra functionalities, such as access to a wider variety of plant options or continuous access to new pods. However, it is important to note that the seed pod subscription does not guarantee a specific outcome or performance, such as having fresh produce without the involvement of a physical product in the process (Tukker & Tischner, 2006). This characteristic distinguishes the system from a Result-oriented PSS model and is solely

used for marketing purposes. Use-oriented models, which focus on access-based product offerings and pay-for-use/pay-per-use systems, are not applicable to this ownership-based product.

Therefore, by focusing on customer ownership of the core product and enhancing its use through subscriptions, these generalized ISG models align best with the Use-oriented PSS category within Tukker's framework. This positioning suggests that the success of a new value proposition lies in empowering customers to engage in indoor gardening through a user-friendly approach. As Yu and Sung (2023) point out, the success of a novel value proposition specifically towards smart PSS ultimately hinges on user adoption and sustained engagement.

Understanding user behaviour and factors influencing adoption is crucial in this context. At the same time, and as mentioned earlier, consumer adoption barriers for, smart, PSS tend to be higher and differ from traditional product offerings. The next chapter dives deeper into this critical aspect for designing a successful business model within the ISG industry.

2.4 Key takeaways and design drivers

This chapter aimed to explore why companies choose to implement service-oriented business models alongside their product offerings. Additionally, research was done on different types of PSS business models through Tukkers' classification framework. This framework categorizes PSS offerings based on the level of ownership and service integration. It identifies three main types of PSS models: product-oriented services, use-oriented services, and result-oriented services. The goal was to classify the state-of-the-art ISG systems with a specific PSS archetype. Based on the analysis, the current ISGs can be classified as a result-oriented and ownership-based system.

Listed below are the key takeaways of this chapter which highlight the important findings and the design drivers which will serve as guidance when entering the design phase of this thesis.

2.4.1 Key takeaways

Differentiation through servitization

Servitization offers a strategic advantage by transforming product offerings into comprehensive solutions. This approach fosters customer loyalty through personalized interactions, generates predictable revenue streams through subscription or pay-per-use-based models, and provides valuable customer insights through data for continuous improvement.

Adoption of PSS

Shifting the focus from product ownership to product usage is central to the PSS paradigm. By emphasizing the benefits and value derived from the service component, businesses can cultivate stronger customer relationships and loyalty.

Customization of business models

It is essential for companies to adapt innovative business models to effectively generate, deliver, and capture unique value from PSS offerings. Tailoring these models to specific market segments and customer needs is crucial for long-term success.

Challenges in PSS implementation

Transitioning from a product-oriented to a product-service-oriented business model presents significant challenges. The intangible nature of services and their experience requires a shift in organizational capabilities and a customer-centric approach.

Ownership vs. Access-Based models

Within PSS models there are two distinct types of models, ownership-based (OB-PSS) versus access-based (AB-PSS) that each pose their opportunities and challenges.

Positioning of ISG systems

Aligning current ISG system with this knowledge, the types of systems are classified as product-oriented PSS by focusing on customer ownership and subscription enhancements.

Critical factors for user adoption

Understanding and addressing user behaviour and adoption barriers for PSS with a specific focus towards indoor gardening is needed to create a successful ISG business model

2.4.2 Design drivers

2.1 Simplicity:

To facilitate a smooth integration into an PSS offering, an initial focus is on a simple and manageable model. By introducing a core offering with growth potential, the company can gain operational experience and customer insights before expanding its offerings.

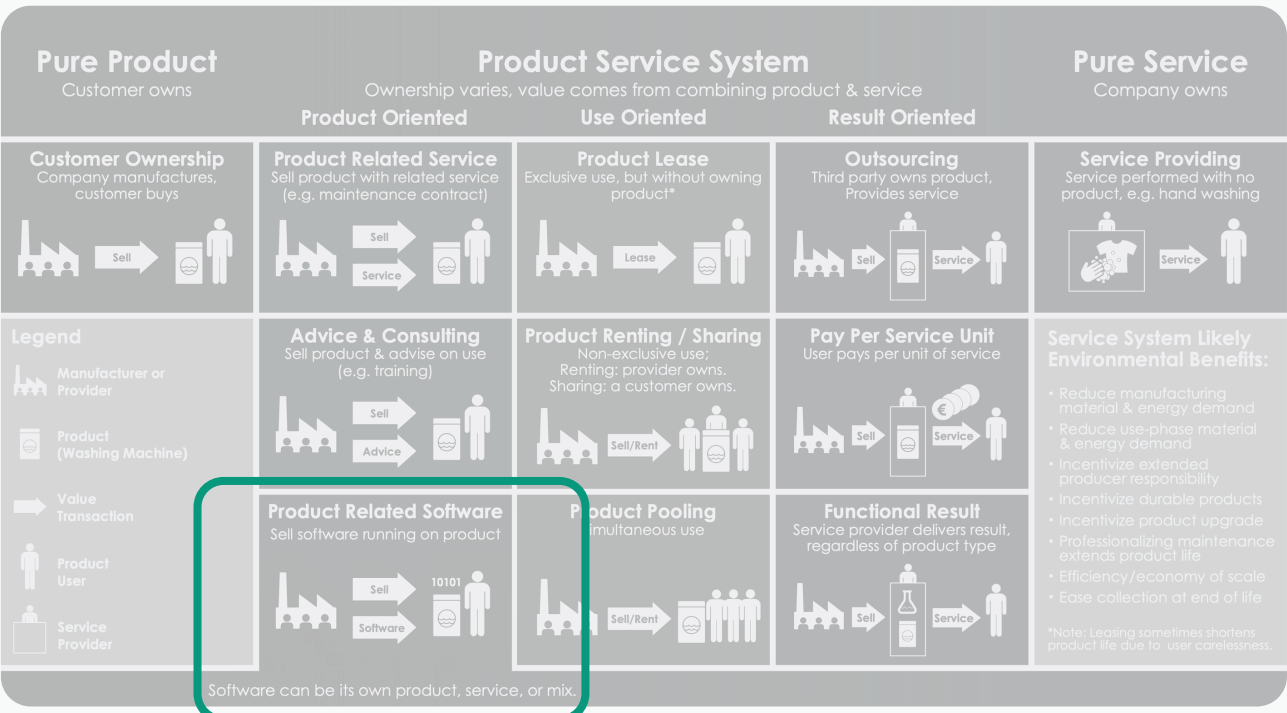


Figure 6B: Product Service System landscape classification according to Tukker (2004)

03

UNDERSTANDING CONSUMER BEHAVIOUR TOWARD PRODUCT SERVICE SYSTEM ADOPTION



LITERATURE REVIEW

This chapter explores literature on consumer behaviour toward adopting new PSS. It provides a general understanding of what motivates or discourages users to adopt a new PSS through existing theoretical adoption models and it identifies the key factors that play influential role when adopting a new PSS. These insights will serve as the foundation for the empirical research to be presented later, where these factors will be tested within the context of this thesis.

Chapter objectives:

1. Understand the adoption factors and barriers associated with PSS adoption through existing adoption models
2. Identify key factors influencing the adoption of new PSS and gain a deeper understanding of the impact of several identified factors on consumer's adoption behaviour
3. Creating a conceptual model identifying factors and barriers that could be used as a foundation of the empirical research

CONTENT

- 3.1 Existing consumer adoption behaviour models
 - 3.1.1 Technology Acceptance Model (TAM)
 - 3.1.2 Value-based Adoption Model (VAM)
 - 3.1.3 Unified Theory of Acceptance And Use (UTUAT 1)
 - 3.1.4 Unified Theory of Acceptance And Use (UTAUT 2)
 - 3.1.5 Innovation Diffusion Theory (IDT)
- 3.2 Key adoption factors and barriers of servitization and PSS
 - 3.2.1 Trust and unfamiliarity
 - 3.2.2 Perceived cost
 - 3.2.3 Ownership vs. Access
 - 3.2.4 Complexity and ease of use
- 3.3 Strategies for adoption
 - 3.3.1 Perceived value
 - 3.3.2 Trust building and risk reduction
 - 3.3.3 Tailored value proposition and user-centric experiences
- 3.4 Consumer characteristics/innovativeness
- 3.5 Conceptualization and theoretical framework
- 3.6 Key takeaways and design drivers
 - 3.6.1 Key takeaways
 - 3.6.2 Design drivers



3.1 Existing consumer adoption behaviour models

The previous chapter discussed the importance of the adoption of new PSS to create from a business perspective, and how to improve and deliver the right value proposition through a successful business model innovation. Consequently, it is equally crucial to understand the different motives consumers have when it comes to adopting a PSS in the context of indoor gardening, as this knowledge is essential in the design of a new or improved concept. Consumer adoption behaviour has been extensively researched over the years, resulting in established theoretical models that can be utilized to comprehend user decision-making regarding new business offerings. These models introduce and examine adoption factors and barriers to explain the reasons why consumers may or may not accept a new (technological) product or service.

Adoption factors serve to encourage consumers to adopt, or hinder adoption. Therefore, different constructs are utilised to analyse the rational and emotional drivers that affect a consumer's decision-making process in adopting an innovation such as PSS. The following sections will utilise some of the most relevant models to identify the key factors influencing consumer adoption of new PSS offerings.

3.1.1 Technology Acceptance Model (TAM)

Developed by Davis et al. (1989), the TAM (Figure 7) focuses on **perceived usefulness** and **perceived ease of use** as the core determinants of technology adoption (in other words; product adoption) instead of the amount of features a product has. This theory claims that consumers are more likely to adopt a technology/product based on their attitude towards using the product if they believe it will enhance their performance and is easy to learn and operate.

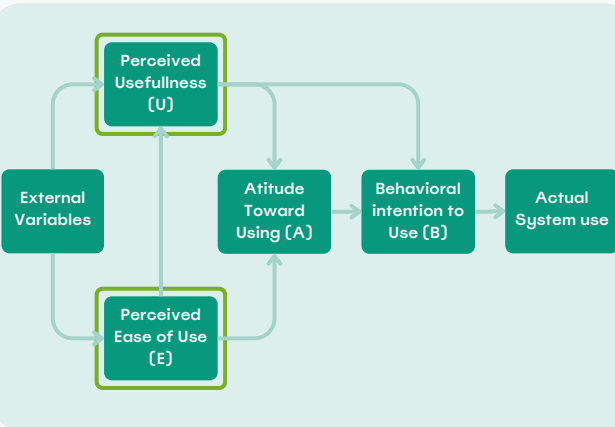


Figure 7: Technology Acceptance Model (TAM) (Davis, 1989)

3.1.2 Value-based Adoption Model (VAM)

VAM (Kim et al., 2007) (Figure 8) is an expansion of the more traditional models like TAM that according to Kim et al. (2017) is limiting the acceptance of new information and communication technology (ICT). VAM expands on this by viewing users as "consumers" and introducing the concept of **perceived value** of Zeithaml (1988) as a central construct of user adoption of technology. This value comes from a balance of **perceived benefits** (usefulness and enjoyment) against **perceived sacrifices** (technical difficulty and cost).

Understanding this cost-benefit analysis of VAM can provide insight into why technology adoption occurs, particularly when considering the theory of TAM along with consumers' perception of value (Kim et al., 2017).

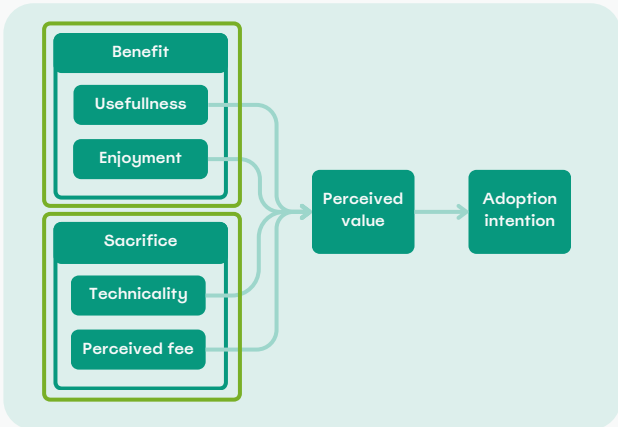


Figure 8: Value-based Adoption Model (VAM) (Kim et al., 2007)

3.1.3 Unified Theory of Acceptance And Use (UTAUT1)

Venkatesh et al. (2003) developed the UTAUT model (Figure 9) by integrating eight other existing models, including the TAM and theory of planned behaviour (TPB) model. The UTAUT model incorporates additional factors to provide a comprehensive understanding of user acceptance of the use of new technologies mainly towards information systems within organizations. According to this model, there are four key constructs:

- **Performance Expectancy** reflects on the user's belief that using the technology will enhance their performance or achieve desired outcomes.
- **Effort Expectancy** measures the perceived ease of use or learning required to operate the technology.
- **Social Influence** captures the degree to which an individual feels pressured by others (e.g., friends, family) to adopt the technology.
- **Facilitating Conditions** refers to the user's perception of the resources and support available for adopting the technology.

The constructs of Performance Expectancy, Effort Expectancy, and Social Influence have a direct influence on the users' behavioural intention to adopt new technologies and facilitating conditions have a direct influence on user behaviour. The effects of the four main constructs are moderated by demographic variables such as gender, age, experience, and voluntariness of use.

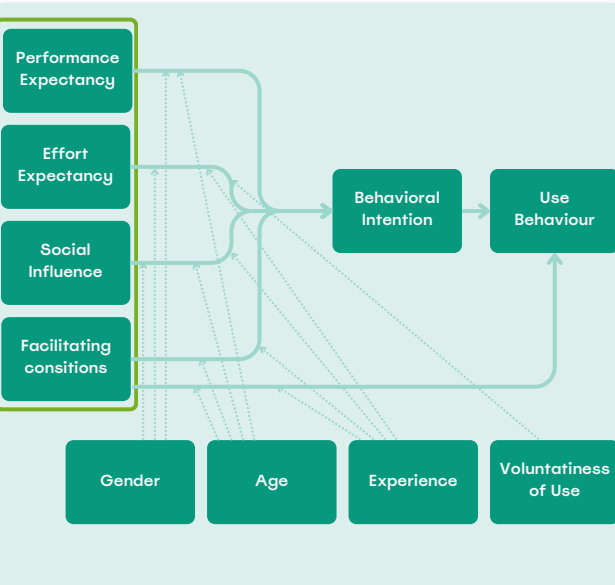


Figure 9: Unified Theory of Acceptance And Use (UTAUT1) (Venkatesh et al., 2003)

3.1.4 Unified Theory of Acceptance And Use (UTAUT 2)

Venkatesh et al. (2012) later introduced UTAUT2 (Figure 10), which is an extension of UTAUT1. UTAUT2 includes factors that are specifically related to the consumer market. The aim of UTAUT2 is to understand the influence of the behavioural intention to use new technologies. UTAUT2 retains the core constructs of UTAUT1 but introduces 3 additional constructs:

- **Hedonic motivation** captures the user's desire to use the technology for pleasure and can also be described as **perceived enjoyment**.
- **Price value** tests the user's perception of the technology's value relative to its price or cost.
- **Habit** reflects on the extent to which using the technology has become an automated behaviour.

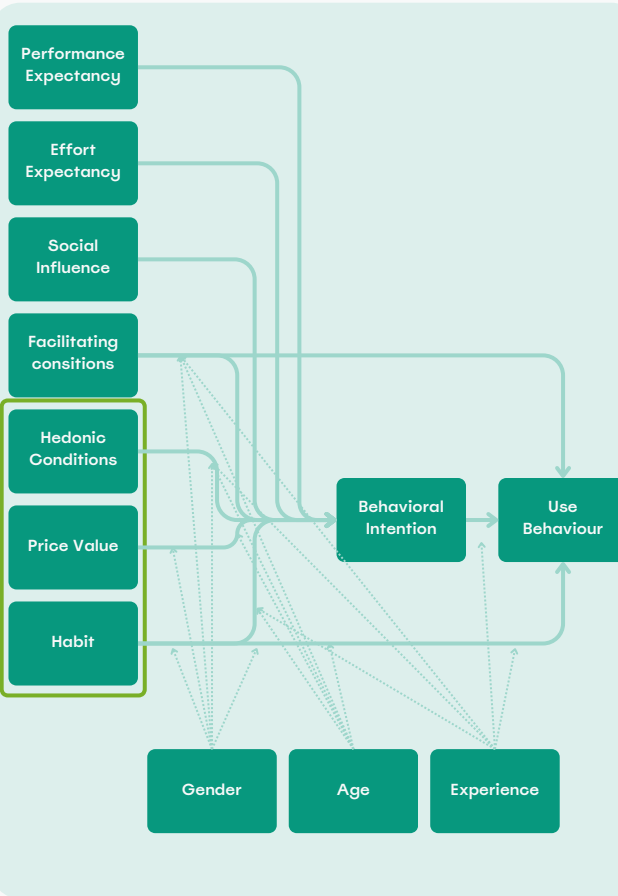


Figure 10: Unified Theory of Acceptance And Use (UTAUT 2) (Venkatesh et al., 2012)

3.1.5 Innovation Diffusion Theory (IDT)

The innovation diffusion theory established by Rogers in 1962 explains how, why, and at what rate new ideas and technologies spread within a social system. This theory goes beyond individual adoption behaviour but explores a more holistic approach toward the diffusion of innovation amongst consumers. According to this theory, adoption occurs when an individual perceives the idea, behaviour, or product as new or innovative Ahmad and Wajid (2015). This perception is what enables diffusion to take place.

IDT acknowledges that adoption does not occur evenly. Different individuals have varying levels of receptiveness toward new ideas, which results in the formation of different adoption categories seen in Figure 11.

Rogers (2003) explains the 5 types of adopters:

- **Innovators** are drawn to newness and enjoy being the first to try new things. They are less risk-averse and often play a role in shaping new ideas. Little effort is needed for this group to get them interested as they are naturally drawn to innovation.
- **Early adopters** are the trendsetters within their social circles, the first to embrace new ideas. They act as a bridge between innovators and the adoption types following them. Early adopters also play a valuable role in testing and refining the innovation. Their early use can help identify potential issues and suggest improvements, ultimately leading to less uncertainty and a broader adoption rate for later users making them a crucial group for the success of any new technology or innovation.
- **The early majority** are more cautious and deliberate in their adoption of new ideas. They often rely heavily on the experiences and information shared by the earlier adopters before deciding to embrace an innovation. While not the first movers, they also don't want to be left behind entirely making them more pragmatic (Ahmad and Wajid, 2015).

- **The late majority** are more sceptical and cautious of change, this group adopts innovations only after seeing widespread adoption. Strategies for this group should emphasize the number of existing users and success stories associated with new innovations.
- **Laggards:** These individuals are highly traditional and resistant to change and base their decisions on the past. Appealing to them might require strong evidence, statistics, and potentially, pressure from other adopter groups.

Within the IDT five key factors are used to measure an individual's decision to adopt an innovation, these are:

- **Relative advantage** emphasizes the perceived benefit of the innovation compared to existing solutions.
- **Compatibility** focuses on how well the innovation aligns with the user's existing values, beliefs, and practices.
- **Complexity** reflects the perceived difficulty of using or understanding the innovation.
- **Trialability** explores the ease with which a user can experiment with the innovation on a limited basis to test compatibility.
- **Observability** focuses on the visibility of the results associated with the innovation. Users are more likely to adopt an innovation if they can readily see the benefits experienced by others who have already adopted it.

From these existing models, a defined set of factors that relate to adoption through consumer behaviour has been identified. In relation to this thesis, it seems the Innovation Diffusion Theory to be highly relevant and aligns well with the aim of the research. However, it is important to note that all of the theoretical models demonstrate a general understanding of the adoption or acceptance of new technologies or innovations. This thesis primarily focuses on the adoption of new PSS (Product-Service Systems). As a result, further literature research has been conducted to explore a broader range of factors that could provide a more comprehensive understanding within the specific context of this research.

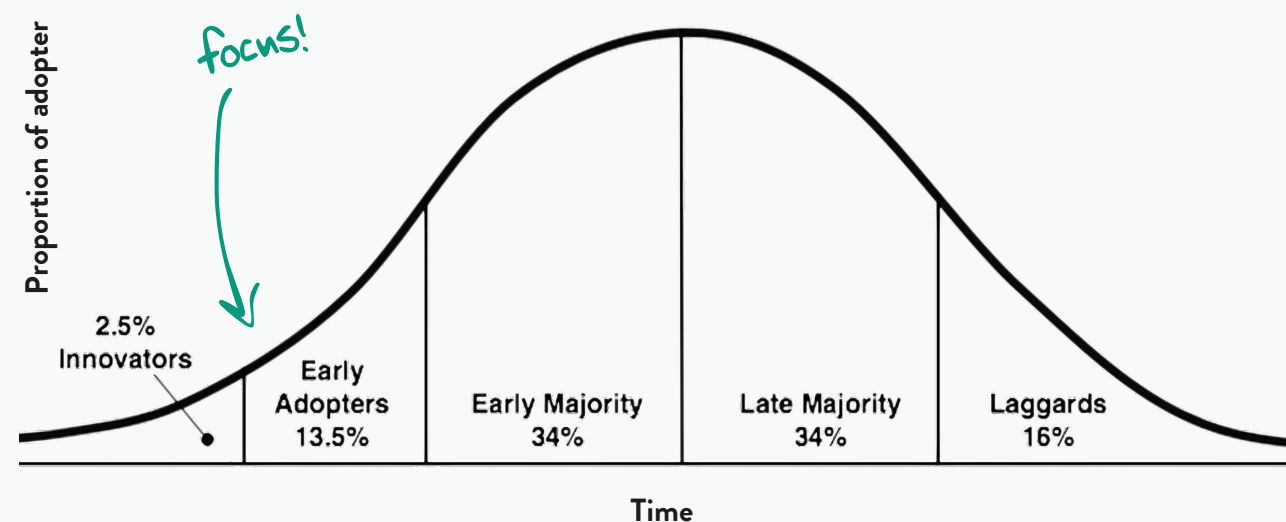


Figure 11: Innovation Diffusion Theory (IDT) (Rogers, 1962)

3.2 Key adoption factors and barriers of servitization and PSS

In order to expand the range of adoption factors considered in this study, a variety of useful studies have been gathered and linked to adoption behaviour in the context of servitization and PSS. This additional literature review has identified other adoption factors that were not explicitly mentioned in the previously discussed theories and models but are relevant to the context of this thesis.

3.2.1 Trust and unfamiliarity

A study conducted by Yang et al. (2016) aimed to identify key factors that influence the adoption of new services. The study extended the Technology Acceptance Model (TAM) by incorporating a new factor: **consumer trust**. This new construct was further divided into two components: **trust in technology (TT)** and **trust in the company (TC)**.

Trust in a company is notably important in decision-making, especially in uncertain exchange relationships (Brandach & Eccles, 1998; Rexfelt et al., 2009) where the consumers' perceived risk is high (Sattari et al., 2020). Existing literature highlights the significance of building trust with service providers, as it forms the basis of a strong partnership between sellers and buyers in relational exchanges (Catulli et al., 2017; Gefen et al., 2003). This becomes even more crucial when consumers are presented with new technologies, particularly within new product categories, as it increases uncertainty for potential adopters. In the case of new PSS, consumers tend to evaluate the product category rather than the brand behind the PSS due to unfamiliarity with the product and/or service which leads to the influence of consumer adoption intention due to trust in technology. This study found that technological trust (TT) has a stronger positive effect on adoption than trust in the company (TC) when consumers encounter a new PSS (Brandach & Eccles, 1998).

In general consumers' perceptions between products and services are different, where services are often assessed on experience attributes, products are evaluated through search attributes. Consumers therefore find it more challenging to assess a service before being able to experience it. This 'perceived risk' occurs due to uncertainty and **unfamiliarity** by being unable to test a new service before adopting it (Yang et al., 2016).

3.2.2 Perceived cost

Yu and Sung (2023) explored the adoption of smart kitchen appliances using the Value-based Adoption Model, revealing

that while consumers highly value high-performance products, they are sensitive to costs, especially when it comes down to **recurring costs** used to improve product performance. Edbring et al. (2016) even argue that this indicates the necessity for a strategic balance between cost and performance to ensure long-term success. Moreover, in AB-PSS ongoing transaction costs and rental payments can create a sense of financial risk for consumers (Borg et al., 2020). Both Yu and Sung (2023) and Wang et al. (2008) concluded that costs discourage users only if the perceived benefits are insufficient. This emphasizes how important perceived value is in reducing the impact of **cost** on adoption decisions.

3.2.3 Ownership vs. Access

Borg et al. (2020) state that the rise of use-oriented PSS (UO-PSS) presents a compelling alternative to traditional ownership models. However, a significant gap exists in the understanding of how companies can encourage consumer adoption of UO-PSS offerings (Borg et al., 2020). The purpose of their study was to improve the understanding of how companies promote the adoption of UO-PSS in everyday consumer goods sectors where ownership is the most common model of consumption.

While UO-PSS offers access to high-end products that might otherwise be inaccessible, Borg et al. (2020) discuss many potential barriers consumers experience within this model such as lack of trust, lack of information, the company motive behind these types of offerings, terms and conditions, and the expected engagement from the consumer. Consumers often face a challenge when trying to understand the value proposition of UO-PSS compared to traditional ownership, which is often seen as the more affordable option (Borg et al., 2020). Furthermore, there are usually transaction costs involved as well as ongoing rental payments, which may create a sense of financial risk (Borg et al., 2020).

Therefore, the barrier Borg et al. (2020) highlighted can be referred to the 'desire to own'. Owning products can foster

3.3 Strategies for adoption

3.3.1 Perceived value

Perceived value plays a crucial role in the adoption of smart PSS, influencing user behaviour. While factors like usefulness, flexibility, reliability, cost, and technicality are important, their impact unfolds gradually over time (Yu & Sung, 2023). The initial perception of value does not always result in immediate and ongoing use but only encourages users to take the first step and experience the PSS. It is during this encounter that the actual significance of perceived value is revealed, and the users can explore the PSS functionalities, making their perception of value change gradually. The continuous delivery of benefits, such as increased efficiency and convenience, strengthens the initial positive perception and encourages continued use (Yu & Sung, 2023). Perceived value acts as a bridge, connecting the initial decision to adopt a smart PSS with the long-term engagement driven by the ongoing creation of value. This highlights the importance for companies to design smart PSS that not only have initial appeal but also deliver sustained value over time.

3.3.2 Trust building and risk reduction

Based on the findings of Borg et al. (2020) study, a set of suggestions have been proposed for companies offering UO-PSS to help increase the adoption and diffusion of PSS in the consumer goods market:

Reduce friction and risk:

Consumer adoption of UO-PSS offerings can be hindered by a sense of unfamiliarity and perceived risk. Companies can address this by minimizing the required behaviour changes and offer familiar services like product maintenance that they would expect to have with owning a product which can reduce the feeling of unfamiliarity. Additionally, providing low-commitment trials allows the consumer to experience the benefits of a UO-PSS without having to pay an upfront investment, further reducing the perceived risk.

Enhancing flexibility and ownership:

Building trust (Sattari et al., 2020) and reducing the desire for ownership are crucial for successful UO-PSS adoption. Similar to the conclusion of Tunn et al. (2019), AB-PSS should offer a clear advantage over traditional ownership. Companies can achieve this by implementing transparent pricing structures, offering flexible payment options and offering trial periods to enhance trust and knowledge from consumers reducing perceived risk (Borg et al., 2020). Companies can also explore innovative solutions like buyback programs or customization features within their UO-PSS business model, allowing users to feel a sense of ownership while still benefiting from the service (Borg et al., 2020).

Adoption intention is also significantly impacted by the company's ability to adapt (flexibility) its product or service to meet unforeseen needs (Yu & Sung, 2023). When combining this with the key factors that have been proven to have a positive influence on adoption rate namely perceived performance, compatibility, and available assistance (Yang et al., 2016), companies create a strong foundation potentially leading to success.

3.3.3 Tailored value proposition and user-centric experiences

Tweaking the perceived values is a critical challenge for adopting PSS and is essential when creating a competitive value proposition (Yu & Sung, 2023). This finding is supported by Borg et al. (2020), who note that personal benefits have a greater impact on PSS adoption compared to social and environmental benefits. While social influence from close relationships does play a role in encouraging adoption (Yang et al., 2016), companies should focus on individual consumer needs to increase success (Tunn et al., 2019).

Another suggestion for increasing user experience and adoption is by addressing consumer worries about financial risks and responsibilities associated with traditional ownership models, such as unexpected costs. Emphasizing the flexibility of PSS can counter the perception that moving away from ownership means losing control. Prioritizing financial, functional, and emotional values over social values provides valuable insights for effective adoption strategies (Borg et al., 2020).

Sattari et al. (2020), along with Rexfelt et al. (2009), emphasize that creating a user-centric value proposition for a PSS depends on simplicity, ease of use, and a seamless user experience between the product and the service (Yu & Sung, 2023). Additionally, it is crucial to provide users with a sense of freedom while balancing it with a certain amount of commitment towards the PSS.

While the growing potential of smart PSS offers increasing opportunities to create and capture value, the success of any new value proposition hinges on users' acceptance and ensuring continuous use (Nemoto et al., 2021). Basically, the advantages of a value proposition are only realized if users are willing to adopt (Yu & Sung, 2023).

a sense of control, freedom, and even emotional attachment (Tukker, 2015) and the perceived risk of buying a service is much higher (Halme et al., 2006). Consumers value the ability to make independent decisions about product use and disposal, which UO-PSS models may seem to restrict (Borg et al., 2020). Additionally, products can hold symbolic meaning, contributing to self-identity and social belonging (Catulli et al., 2017). However, delivering a high enough value through your service will make this behaviour change more tangible (Borg et al., 2020).

Cherry and Pidgeon (2018) did a deep dive into the factors that determine public acceptance of PSS, particularly focusing on the challenges associated with adopting non-ownership-based consumption models. The authors identified price and affordability as significant factors for public acceptance, concluding that lowering use costs compared to outright purchasing could encourage consumer uptake (Cherry & Pidgeon, 2018). However, they also emphasized that to increase acceptance, factors like product-service specifics, consumer characteristics, and the relationship with the service provider play a significant role.

3.2.4 Complexity and ease of use

Tunn et al. (2019) studied the adoption factors with the use of IDT for access-based PSS to increase a wider diffusion of innovation. Within the five constructs used in the IDT, the authors defined a more specific set of adoption barriers for a deeper understanding creating a list of 17 'sub-barriers'. The study found that consumers compare AB-PSS offerings to traditional ownership models, assessing factors such as product quality, ease of access, financial benefits, and emotional value. One particularly significant factor driving the success of AB-PSS is the convenience it provides.

All elements can cause consumers to reject a PSS. The amount of given factors that could influence adoption also mirrors the complexity of AB-PSS, they are inherently complex due to the combination of infrastructure, services, and product elements (Tunn et al. 2019). Yu and Sung (2023) further emphasize the importance of **simplicity (barrier: complexity)** and **ease of use** for user adoption, highlighting the importance of seamless user experience between both the product and the service.

Designers can leverage PSS to minimize or remove obstacles to customer acceptance, including issues of complexity, cost, and trust (Smith, 2014). In addition to employing design thinking to overcome these barriers, there have been numerous recommendations in the literature on enhancing consumer adoption of PSS models.

3.4 Consumer characteristics/innovativeness

Wang et al. (2008) studied the factors influencing the evaluation and adoption intention of 'really new' products and services. Their research shows that consumers' innovativeness and prior knowledge, described as individual characteristics, add to the intention to adopt. These individual characteristics also positively impact the perceived benefits and newness of novel products and services, increasing the adoption rate. This suggests that individuals with high innovativeness prioritize experiencing the new product/service over cost considerations.

Research suggests that 'innovators' and 'early adopters' of new technologies, adapter groups from the IDT, tend to be younger with higher income and education levels (Rogers, 1995). Although higher education levels are associated with greater scepticism towards new PSS (Yang et al., 2016).

For PSS to be successful, the offering must align with the consumer's personal preferences and needs, emphasizing individualization and customization which can be achieved by offering a variety of arrangements that will also reduce the perceived risk barrier for the consumer (Sattari et al., 2020).

To succeed in PSS adoption, the understanding of consumer needs and preferences is crucial (Reim et al., 2015) for developing the right value proposition, tailored to individuals' benefits, and when creating the right strategy (Annarelli et al., 2019).

The knowledge gained from this literature review has created insights into not only consumer adoption behaviour towards PSS but has also served as a foundation for exploring possible strategies that help overcome some of these barriers which might prove to be useful later on in this thesis.

3.5 Conceptualization and theoretical framework

This section aims to finalize the factors and barriers that influence the adoption process of PSS, which will be further explored in the empirical phase of the study. By synthesizing existing models and incorporating insights from relevant studies, a detailed inventory of factors and barriers specific to the consumer adoption process of PSS was created. A conceptual model was then developed using a clustering technique to group similar factors and barriers, resulting in a more coherent and manageable set of adoption challenges (see Figure 12).

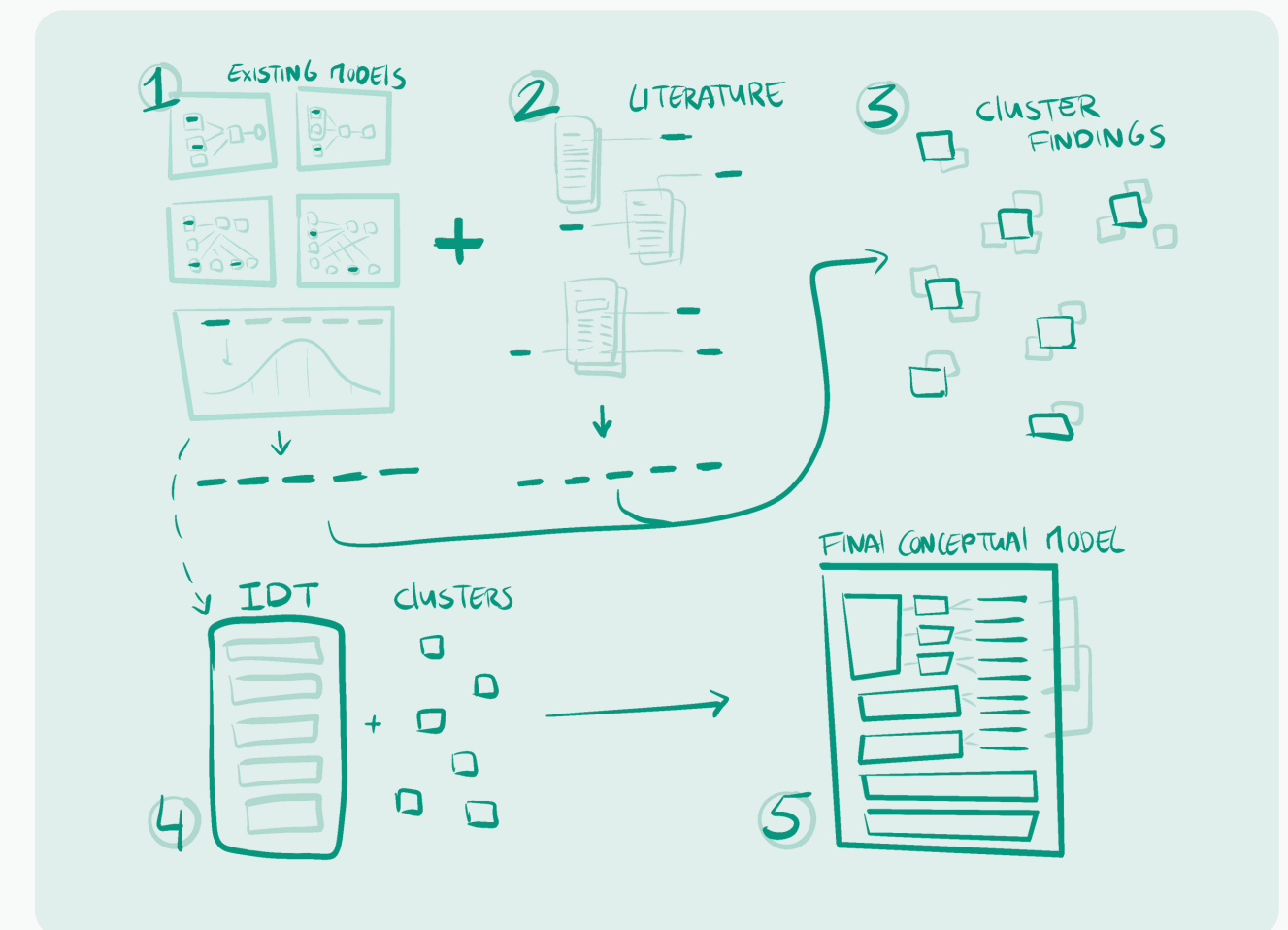


Figure 12: Process of creating conceptual model

An in detailed approach on this process can be found in Appendix 3.

As previously discussed, and justified, the Innovation Diffusion Theory (IDT) (Rogers, 2003) was chosen as the most relevant theoretical framework for this thesis, which focuses on the diffusion of business innovations through consumer adoption behaviour. Therefore, the IDT serves as the foundational framework for this study.

3.6 Key takeaways and design drivers

This chapter provides a comprehensive analysis of the factors and barriers that impact the adoption of (novel) PSS. As a result, a conceptual model has been developed to summarize this knowledge, which will be used as a reference for the empirical research that follows.

The following are the key findings and design drivers derived from this chapter.

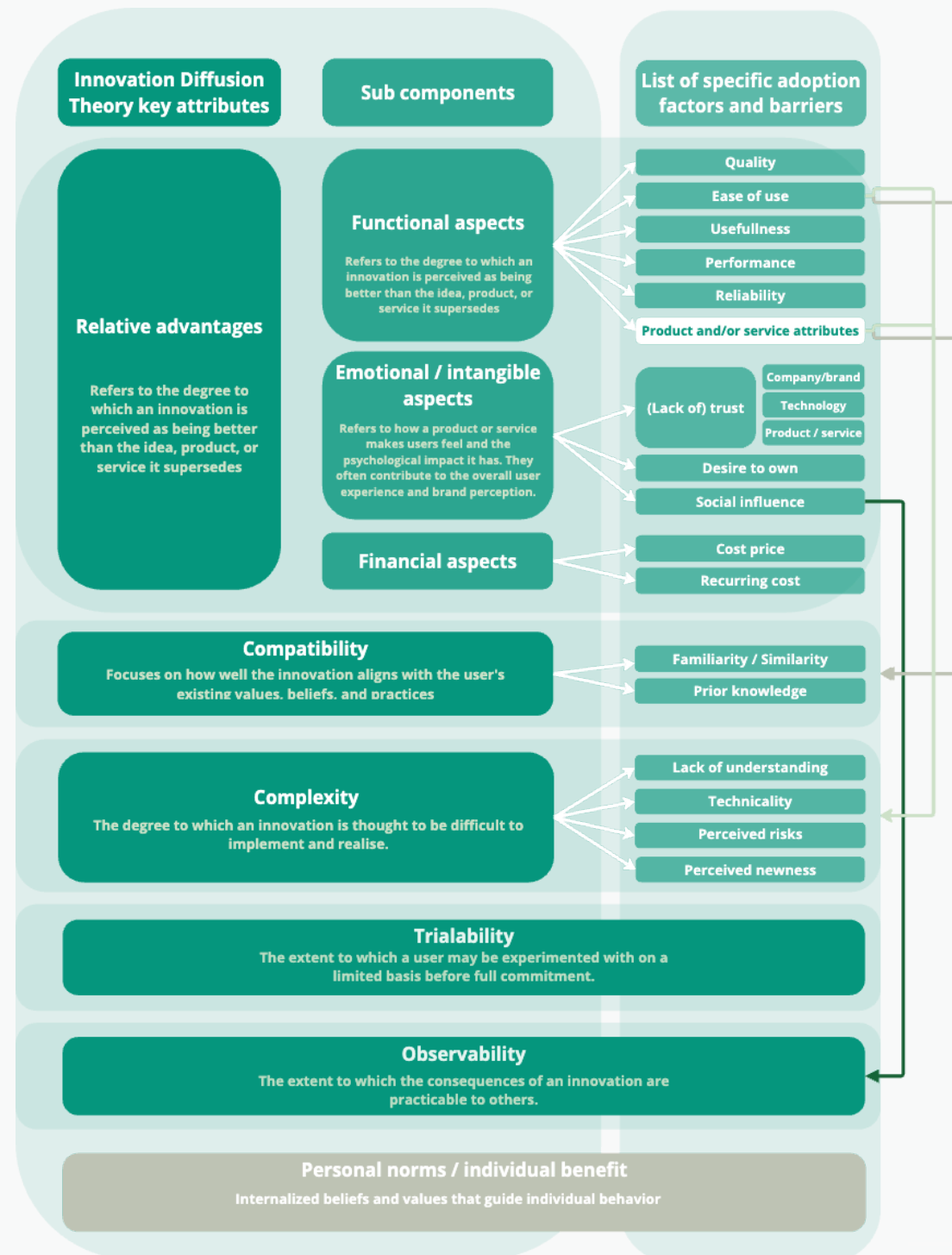


Figure 13: Created conceptual model

The conceptual model (Figure 13) further expands upon these key factors by generating a list of specific adoption factors and barriers, which will provide detailed research insights during the empirical phase. It is important to note that within this model factors and barriers are not distinct from each other, as their effects can be either positive or negative depending on the context in which they are examined.

The construct of "Product and/or Service Attributes" is inherently abstract, as it does not specify which attributes may impact adoption. These insights will be explored in greater depth through empirical research. Additionally, "Personal Norms" are included as an independent variable,

recognizing their relevance in the adoption process. Therefore, this variable is integrated into the model as a distinct influencing factor, which could provide a deeper understanding during empirical investigation.

Some factors and barriers apply to multiple categories within the Innovation Diffusion Theory, and many of the identified factors can be interpreted or linked to one another. As a result, this model offers a holistic perspective on a broad set of interrelated factors, facilitating a comprehensive understanding of consumer adoption behaviour that can be applied during the empirical research targeted towards the adoption and perception of state-of-the-art ISGs.

3.6.1 Key takeaways

Existing consumer adoption models

The use of several well-known adoption behaviour models have been explored to gain insights in multiple academically acknowledged adoption barriers. The explored models are:

- **The Technology Acceptance Model (TAM)** focuses on perceived usefulness and ease of use as key determinants of technology adoption,
- **Unified Theory of Acceptance and Use (UTAUT1)** uses four key constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions that influence user adoption,
- **Unified Theory of Acceptance and Use (UTAUT2)** which adds Hedonic Motivation, Price Value, and Habit to the UTAUT1 model to better understand consumer behaviour,
- **Value-based Adoption Model (VAM)** which focuses on the perceived value by balancing perceived benefits and sacrifices,
- **Innovation Diffusion Theory (IDT)** explains how new ideas and technologies spread within a social system and identifies different adopter categories.

Additional adoption factors and barriers discovered through literature:

trust (in technology or a brand), uncertainty, familiarity, cost sensitivity, ownership vs access models (desire to own), and the perceived ease of use.

3.6.2 Design drivers

3.1 Perceived value:

Ensure the PSS offers an appealing initial value proposition and continues to deliver benefits such as increased efficiency and convenience over time. Design functionalities to gradually reveal their value, enhancing long-term engagement, improving the offering and creating a seamless experience.

3.2 Trust building and risk reduction:

Minimize behaviour changes by offering familiar services like product maintenance to reduce unfamiliarity and perceived risk. Provide low-commitment trials to allow users to experience the benefits without significant upfront investment. Implement transparent and flexible pricing structures and ensure the PSS can adapt to unforeseen user needs to build trust and reduce perceived financial risk.

3.3 Tailored value proposition and user-centric experiences:

Prioritize personal benefits over social and environmental ones to increase adoption rates. Create a seamless and user-friendly experience between the product and the service and provide users with a balance of freedom and commitment towards the PSS.

3.4 Consumer characteristics and innovativeness:

Design PSS offerings that appeal to younger, higher-income, and more educated consumers who are typically early adopters. Align the PSS with individual consumer preferences through customization options to reduce perceived risk and emphasize the innovative aspects and unique benefits to attract consumers with high innovativeness.

04

EXPLORING THE BRAND

RESEARCH



This chapter explores the client, elho group, in more depth by conducting an internal analysis. The goal of this analysis is to uncover their current business landscape, DNA, offerings, and other factors, in order to gain a comprehensive perspective on their strengths and weaknesses of the company. This information will help in answer the research question and will help in creating a concept that would match this company.

The information for this chapter will be gathered through internal interviews with several departments of the company, observations, desk research, and the use of (design) methods.

Chapter objectives:

1. Conduct a comprehensive analysis of elho group's current company landscape, including its organizational structure, product portfolio, business partners, values, and purpose. These insights will enable a detailed assessment of the company's strengths and weaknesses within the research context.

CONTENT

- 4.1 Internal analysis
 - 4.1.1 Brand, identity, and offerings
 - 4.1.2 Current business landscape and positioning
 - 4.1.3 Elho's consumer base
- 4.2 Strengths and weaknesses (SWOT)
 - 4.2.1 Strengths
 - 4.2.2 Weaknesses
- 4.3 Key takeaways and Design drivers
 - 4.3.1 Key takeaways
 - 4.3.2 Design drivers as a result of the Internal analysis



4.1 Internal Analysis

This internal analysis aims to provide a comprehensive understanding of elho Group. It focuses on the company's current landscape, positioning, identity, operational structure, and consumer base. The primary objective is to evaluate elho's readiness for a strategic shift towards servitization and determine how this transition can be seamlessly integrated within the company's existing framework. Understanding a company in depth helps shape innovation to better align with its DNA, thereby improving the potential match between new designs and the company's identity.

During the initial weeks, insights and knowledge were gathered through introduction talks and interviews with employees from various departments. This information has been translated into visual overviews, which provide external readers with a holistic understanding of the company operations. This fresh, external perspective will ultimately lead to an evaluation of elho's strengths and weaknesses in the context of this thesis. Concluding with the identified key factors that could influence the success of adopting a PSS model, offering a foundational understanding to guide the subsequent stages of this research project.

4.1.1 Brand, identity, and offerings

The visuals presented (Figure 14) on this page is a representation of elho as a brand. It includes their brands, purpose statement, vision, values, product offerings, and more and portrays the overall look and feel of the brand.

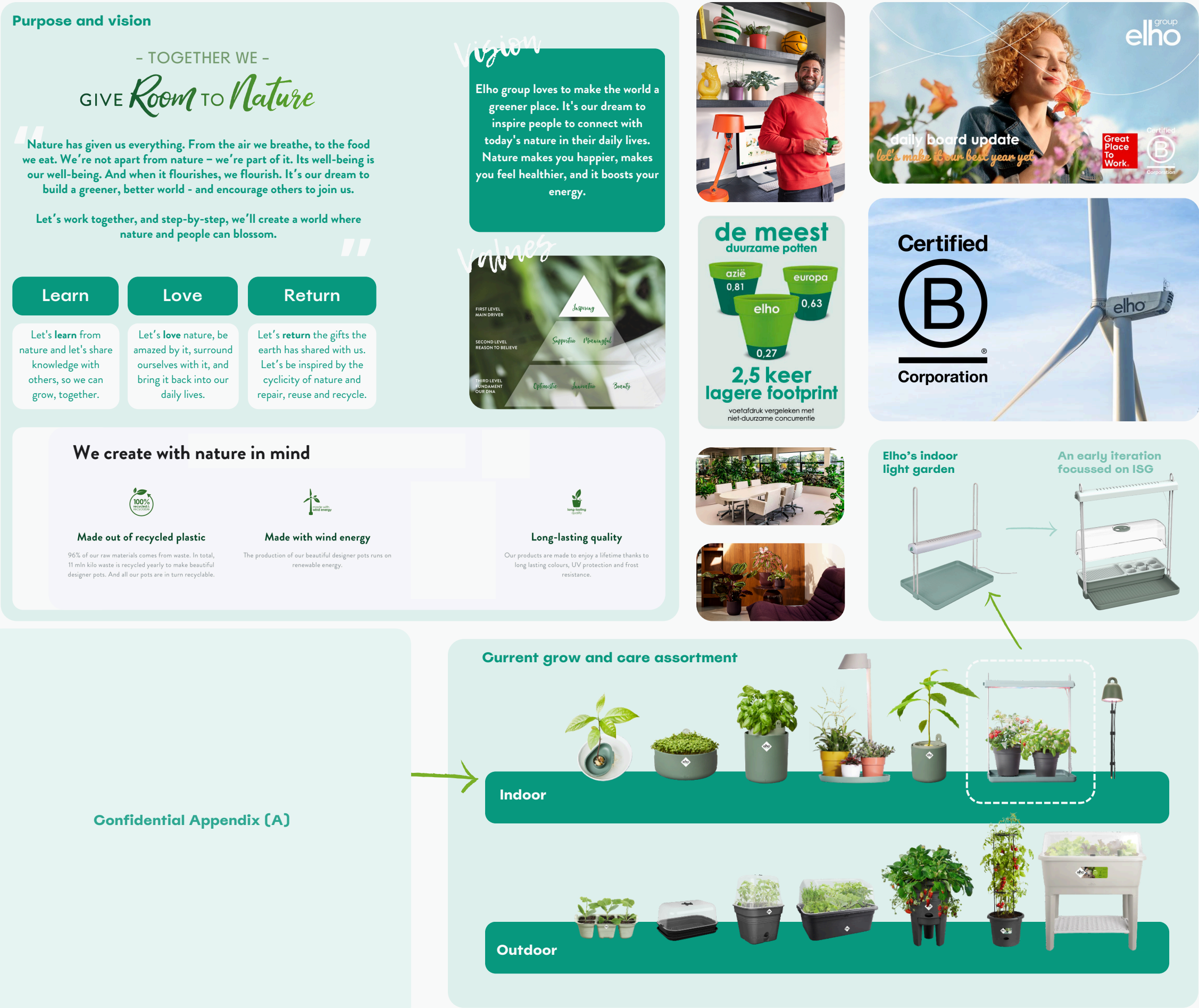


Figure 14: Elho's brand, identity and offerings

4.1.2 Current business landscape and positioning

The current business landscape of elho, illustrated in Figure 15, showcases the diverse resell channels and key partners through which Ehlo’s products are distributed. Elho primarily operates through a business-to-business (B2B) model, relying on a network of resellers to reach its broad consumer base. Figure 15 provides a detailed overview of the geographical distribution of elho's products, distinguishing the core markets, smaller European markets, and (even smaller) export markets outside Europe.

Elho's products are predominantly sold through resellers, but a small percentage of sales comes directly from elho’s webshop which is currently only running in the Netherlands, Spain, France, and the UK. The resell channels are extensive and varied, encompassing major partners who have established strong collaborations with elho over the years. Elho holds a prominent position within the horticulture industry, being recognized as the leading brand in Europe. This was evident when visiting the Spoga Gafa conference in Cologne, Germany, in June 2024, where they featured the largest and most well-designed stand, with many competing brands imitating their products. This underscores elho's role as an innovator when it comes to product design and production techniques, consistently sourcing new sustainable materials and improving on advanced production-compatible designs.

Elho's greatest value lies in its transparency and leadership in sustainability, which distinguishes it from competitors. Their plant pots, made from recycled and recyclable materials, are the most sustainable in the industry, outperforming competitors across various materials used in the pot business. This commitment to sustainability is a cornerstone of elho's market positioning and a key factor in their competitive advantage.

Confidential Appendix (B)

Figure 15: Current business landscape

4.1.3 Elho’s consumer base

Elho positions itself as a producer of products for a broad consumer base, guided by the philosophy that people thrive in environments enriched by nature. To cater to diverse consumers, the company operates through three brands across varying price points, all sold through partnered resellers. While this business-to-business (B2B) model has been effective in achieving a strong market position, it creates a gap between the company and its end consumers.

Elho's most budget-oriented brand, Goods Factory, adopts a partner-centric approach to product development. Retailers provide specific briefs, which drive product design—a "they ask, we deliver" model. In contrast, the Florus and elho brands are developed internally, based on current company knowledge and broader market trends within the horticulture industry. While this approach has contributed to the company's growth and leading market position, it reveals a gap in direct consumer insights as most developments are based on trends and behaviours seen in different industries rather than on direct consumer feedback. This is, perhaps, a more common approach for product-centric companies but worth noting this is their standard when it comes to product development.

A preliminary investigation into elho's consumer base, utilizing consumer panel tests, research reports, and Instagram analytics, highlights a reliance on assumptions about consumer needs and preferences when introducing new products. Although the company has successfully established a market presence, questions remain about the sustainability of this approach with the introduction of more service-oriented offerings or a potential shift to a business-to-consumer (B2C) model.

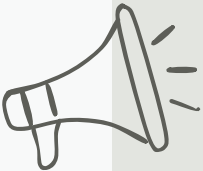
This internal research has yielded several insightful findings.

Confidential Appendix (C)

Confidential Appendix (C)

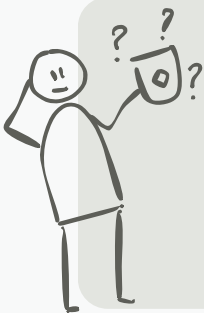
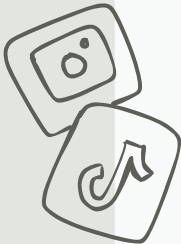
4.2.2 Weaknesses

Brand awareness



Limited platform reach:

Elho's current social media presence is predominantly on Instagram, with a following of 66,000 users. The majority of these followers are from European countries, specifically the Netherlands (21%), Spain (18%), the UK (10.2%), Italy (10.2%), and France (6.9%) (Interview N. Lurings, Online Marketing elho, 2024). However, the **available consumer insights are limited** to gender and age, restricting a comprehensive understanding of the followers and potential consumers engaged through online content. Additionally, **elho's marketing strategy has yet to incorporate the growing popularity of the social media platform TikTok**. Research indicates that TikTok can be more effective in increasing brand awareness, influencing purchasing decisions, and enhancing consumer satisfaction (Nguyen et al., 2024). Integrating TikTok into elho's marketing strategy could therefore be beneficial for expanding its brand reach, engagement and support in the launch of new products.



Retailer dependence and untapped potential of a strong USP:

Elho's reliance on selling through retailers with their own branding weakens consumer recognition of the elho brand itself. **Consumers might not readily associate the products with elho**, potentially diminishing the impact of their brand identity. Especially because the company possesses positive attributes like being innovative, sustainable, and award-winning. However, these are not effectively communicated, neglecting a valuable unique selling point (USP). These are attributes the target group values in products and brands and could increase the adoption rate amongst younger demographics. Highlighting their social and environmental purpose even more could be a powerful tool to attract new customers.

Consumer insights

Limited consumer data:

Elho currently **lacks active data collection on consumer demographics, buying habits, and needs** mainly because with their current business model they rely on the sales through retailers. **Selling through resellers makes it difficult to track data on consumers** who actually purchase their products. Elho primarily relies on customer service interactions or external market research, offering limited insights into its actual customer base. This model **doesn't capture the ongoing feedback and data collection** essential for adapting a PSS to meet changing consumer needs, their preferences and ensure customer satisfaction. A shift or addition to their current model with a focus on direct consumer interaction and data collection is necessary.



Data security challenge:

Launching a PSS that involves collecting and using customer data necessitates **data security** measures to protect user privacy. This adds a layer of complexity and ongoing responsibility that elho needs to address.

Lack of service design and operational expertise

With elho being a product-driven company with no prior experience in service design, user experience (UX) specific to PSS, or delivering a PSS, there could arise possible challenges, specific challenges could be:



Workflow and service delivery:

Elho's current business model is designed around one or two collections that are launched annually, aligning with **seasonal gardening demands**. This approach coordinated efforts across all departments during these launch periods. However, implementing a Product-as-a-Service (PaaS) model presents a significant **operational shift**. Unlike seasonal product launches, a PaaS model **demands continuous and efficient product and service deliveries throughout the entire year**. Effectively integrating this next to the current workflow might lead to adapting work processes and potentially changing department structures when you want to keep it in-house.

4.2 Strengths and weaknesses (SWOT)

To captivate all of the findings gathered from the internal and external analysis a SWOT analysis has been used. This method allows the systematic analysis of the strategic position of elho within this new context of PSS development and could be beneficial in choosing the direction for further concept development (van Boeijen et al., 2013).

The internal analysis helped shape the **strengths** and **weaknesses** presented in the SWOT model which is shown in Figure 16.



Figure 16A: SWOT model

4.2.1 Strengths

Strong brand with a sustainable purpose



Elho positions itself as a purpose-driven brand with a focus on environmental responsibility. Their B-corps certification through their sustainable operations adds to their **positive brand name reputation**. This aligns perfectly with the growing interest in sustainable living and resonates with the overall personal norms of current and potential consumers making it a **future-proof company**. Leveraging existing brand awareness can give this new product a significant advantage. After all, brand recognition is a key factor influencing consumer adoption of new products.



Market leader in design and innovation



Elho is a **recognized and respected leader in the market** for sustainable plastic designer plant pots. They have managed this leadership position by taking risks, moving along with the time, and having strong and timeless products. The combination of their thorough understanding of sustainable design, innovation through design, and 60 years of rich expertise in the business provides an exceptional **foundation to enter new market segments** in the plant and garden industry. Their **strong suit for designing** aesthetically pleasing, sustainable, **high quality and user-friendly products** will be a big advantage that will contribute when designing our own indoor garden system.

Financial stability and resources for growth

Elho's financial stability and **access to resources** allow them to create a **risk-tolerant environment** for product and business innovation which is also reflected in their innovation leadership philosophy with which they operate. This flexibility enables them to gather the right resources which can be **invested in partnerships, external expertise, and research**, ultimately enhancing the success rate of new innovations or ventures. They are open to introducing new products and innovations to expand their product portfolio and grow their business.



Strong presence and operational excellence



Elho's established **B2B network** and presence across the Benelux (focus area), along with their operational excellence, provide a strong foundation for distributing their ISG.

Efficient manufacturing and distribution

Elho's in-house manufacturing and established distribution channels can be leveraged for **efficient production and delivery**, ensuring **cost-effectiveness** and **timely product availability**.



Metrics:

Developing new metrics to evaluate customer satisfaction, service delivery, and long-term value creation (as traditional product metrics might not be suitable).

**Branding and user experience:**

Creating a cohesive PSS experience that aligns with existing branding and provides a premium feel, including UX/UI design, packaging design, instructions, and support. With no in-house graphic designer, this would also be something that needs to be outsourced.

B2B-oriented and current partnerships**Current retail partners:**

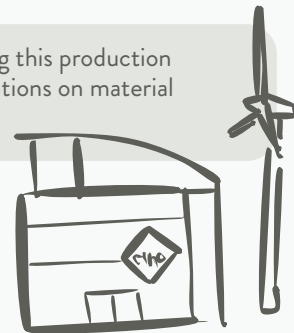
Elho's current B2B partners, primarily consisting out of larger retailers like budget stores, garden centres, DIY-stores and big online retailers, might not be ideal for reaching their new target group focused on a specific lifestyle. This necessitates establishing **new partnerships** with businesses that better align with the new product and target audience (if retail partnerships even come into play).

**PSS partnerships:**

Launching a product-service system (PSS) necessitates establishing new partnerships to address various aspects like external manufacturers for smart electronics, suppliers for consumables (seeds, soil pods), and potentially platform management companies for **data management and optimizing user experience**. While partnerships offer valuable expertise and resources, establishing and maintaining these relationships takes time and effort and could cause difficulties if not managed effectively.

No In-house smart product production

Elho lacks the capability to manufacture smart electronics themselves. Outsourcing this production introduces challenges in achieving a fully sustainable product due to potential limitations on material selection and manufacturing processes of external partners.



4.3 Key takeaways and design drivers

In this chapter, an internal analysis of the client elho Group has been conducted in order to gain a thorough understanding of the company. The key takeaways and design drivers derived from this chapter are outlined below.

4.3.1 Key takeaways

Consumer insights and feedback gaps:

Elho's B2B model results in a gap between the company and its end consumers due to retailers acting as intermediaries. This leads to missing out on crucial consumer data for profiling and limits strong brand awareness. This is important to note because PSS thrive on consumer data.

Customer insights from internal research:

- **Automated Watering Systems:** Consumers value these systems for the sense of freedom and peace they provide, reducing concerns over watering schedules. There is a strong need for low-maintenance plant care solutions, as many consumers struggle to keep plants alive for long periods.
- **Space Efficiency:** Limited counter space in kitchens highlights the need for space-efficient plant care products.
- **Home Gardening Trend:** The trend of home vegetable gardening has been growing, especially since the COVID-19 lockdown, presenting an opportunity for elho.

Brand awareness and perception:

Elho is better known among eco-minded consumers aged 35 to 55, particularly women and those focused on home and garden styling. Despite growth in brand perception, overall strong awareness remains low, with only a small percentage of consumers fully aware of the brand and its products.

Strengths and Weaknesses:

- **Strengths:** Strong brand with a sustainable purpose, market leader in design and innovation, financial stability, strong B2B presence, and efficient manufacturing and distribution.
- **Weaknesses:** Limited consumer data, reliance on retailers, lack of service design experience, no in-house production for 'smart' products, and limited social media presence.

4.3.2 Design drivers

4.1 Designing for space efficiency:

Focus on developing compact, space-efficient plant care solutions that fit well in small living spaces, especially urban environments.

4.2 Improving brand communication and awareness:

Explore direct-to-consumer sales to gather more consumer insights and boost brand recognition. Enhance communication strategies to better convey the uniqueness and purpose of elho's products. Expand social media presence, particularly on TikTok, to increase brand awareness among younger demographics.

4.3 Leveraging strengths and addressing weaknesses:

Utilize elho's brand reputation and sustainable practices to attract eco-minded consumers. Invest in building service design and operational expertise to support the development and delivery of PSS.

4.4 Possible new retail partner for PSS:

Identify and establish partnerships with retailers that align better with the target market for PSS, as current retail partners might not be the best fit.

05

EXPLORING THE MARKET

RESEARCH



Next to the internal analysis, an external analysis will be conducted on the current market landscape of the ISG industry. This analysis will identify current competitors within the industry and provide insights that will benefit elho Group in understanding this new industry including an in-depth consumer review analysis based on the experience of current ISG consumers. This will provide insights into the industry's opportunities and threats, which helps to understand how elho can contribute and penetrate this market.

Chapter objectives:

1. Develop a thorough understanding of the current market landscape of the indoor gardening industry. This will involve mapping competitors and analysing their business models, market positioning, consumer reviews, and the potential impact on elho's entry into the industry. By obtaining a holistic view, opportunities and threats can be identified, aiding in the strategic positioning of elho within this new market segment.

CONTENT

- 5.1 External Analysis: Competitive landscape
 - 5.1.1 Identifying the competitor landscape
 - 5.1.2 Competitor brand analysis
 - 5.1.3 Competitors that have not survived the industry
 - 5.1.4 Findings and observations from the competitive landscape analysis
- 5.2 Consumer review analysis
 - 5.2.1 Method
 - 5.2.2 Results review analysis
- 5.3 Hands-on user testing through the eyes of a designer
 - 5.3.1 General observations product testing
- 5.4 Opportunities and Threats (SWOT)
 - 5.4.1 Opportunities
 - 5.4.2 Threats
- 5.5 Key takeaways and design drivers
 - 5.5.1 Key takeaways External analysis
 - 5.5.2 Design drivers as a result of the external analysis



5.1 External Analysis: Competitive landscape

This section provides a thorough analysis of the ISG industry. The main objective is to uncover important industry dynamics, competitive landscapes, and consumer perceptions. All current and relevant brands in the field of indoor gardening have been taken into account in this analysis including a deep dive into consumer reviews. Additionally, hands-on testing of various ISG products have been done to gain firsthand insights into their functionalities and user experiences. The findings from this analysis will serve as a basis for identifying strategic opportunities and potential threats for the development of a new ISG product.

To successfully introduce a new product to the market, it is crucial to have a deep understanding of the competitive landscape. This includes identifying the main players, carefully analysing their strengths and weaknesses, and

identifying any gaps in the market. By conducting a thorough competitor analysis, businesses can effectively position their products and create a distinct value proposition. This knowledge is vital for navigating the market, anticipating potential challenges, and taking advantage of emerging opportunities.

5.1.1 Identifying the competitor landscape

This analysis focuses on the indoor (smart) gardening market with a slight focus on the targeted market of the Benelux region that was chosen for the context of this thesis. Competitor selection was based on thorough desk research. Figure 17 provides a visual representation of the competitive landscape, categorizing competitors based on their level or type.

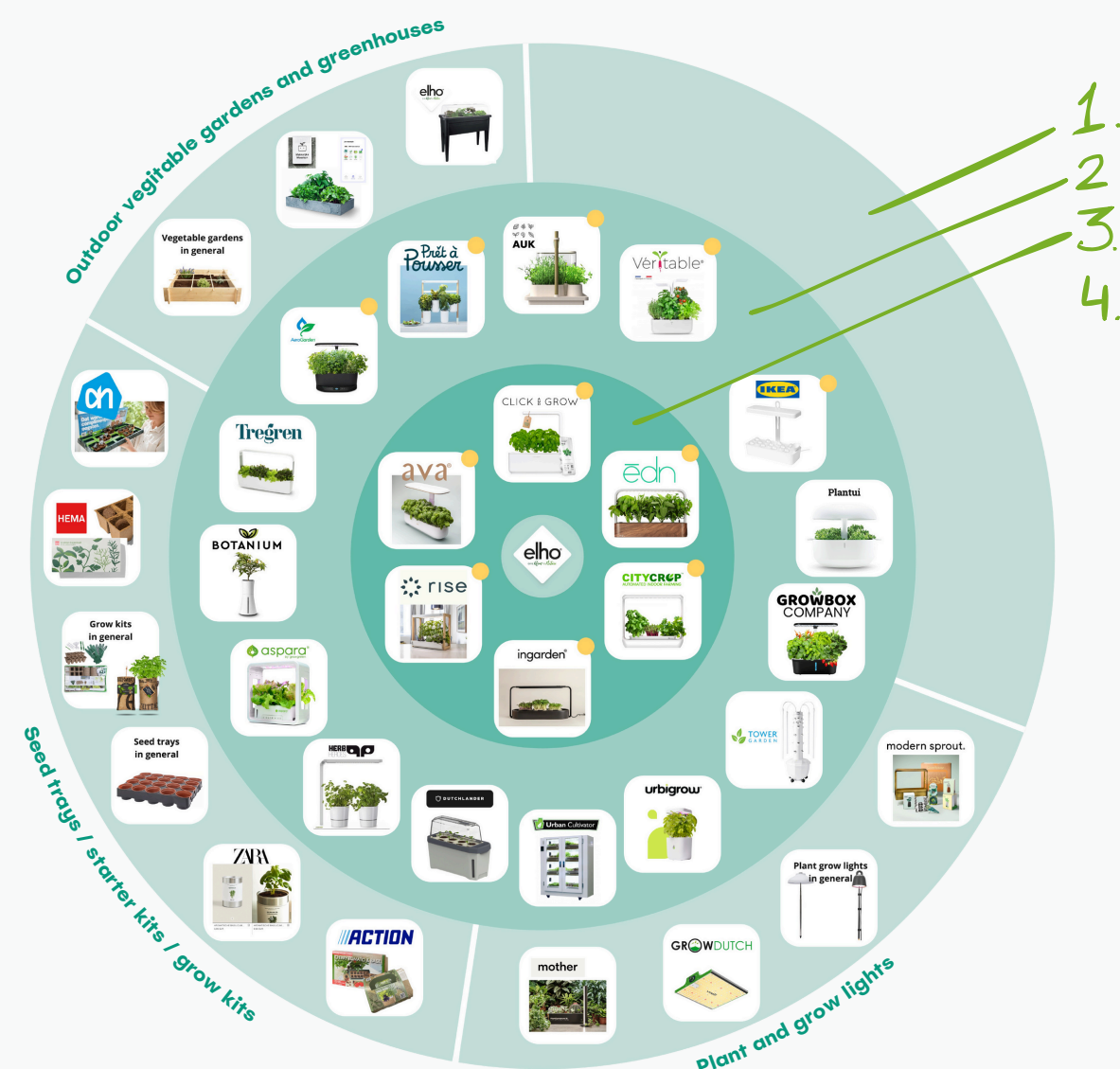


Figure 17: Competitor landscape

1. Indirect competitors

There are other ways of being self-sufficient in growing edible plants or services that supply consumers with fresh produce. The indirect competitors are the type of brands that offer different solutions, but who are addressing the same core customer need with a substitute product or service. By analysing these brands within the competitive landscape, it enables to comprehend why certain consumers may opt for alternative products and to find out the underlying motives or needs behind these alternative offerings.

2. Hybrid competitors

Given the diverse range of indoor gardening products available, a hybrid competitor category was introduced. This category encompasses brands offering similar products without the 'smart' functionalities typically associated with ISGs. While lacking advanced features or additional services, these competitors address core consumer needs and may pose a potential threat due to their slightly different approach to indoor gardening.

3. Direct competitors

For this analysis, the direct competitors refer to companies worldwide that provide ISG systems as a Product-Service System (PSS). To ensure a thorough evaluation, all active players in the ISG industry were assessed as the industry is relatively young so each company could provide useful insights. To be considered a direct competitor, a company's system must include automated watering, grow lights, and app connectivity.

4. Replacement / substitute competitors

The biggest threat might originate from replacement competitors who you might not see coming in the first place. These are brands that offer products or services from a completely different industry that fulfil a similar need or solve the same problem for the customer. This could be brands that replace the need for our product or service altogether. They alter the way that goods and services are delivered rather than the actual goods or services themselves (Hover, 2022).



In Figure 17, a visual overview of the key players in the Indoor Smart Garden (ISG) market is presented, highlighting that many of the direct and hybrid competitors offer highly similar products. This suggests that companies see potential in the system as the market is characterized by a limited range of differentiated products but a wide variety of offerings. To understand how these individual systems work, a deeper brand analysis will be conducted.

5.1.2 Competitor brand analysis

To gain a deeper understanding of the industry, a thorough analysis of a selection of brands has been conducted. The brands were chosen based on their level of competitiveness, including both direct competitors and prominent hybrid competitors.

A comprehensive analysis framework has been developed, encompassing all relevant factors that provide insights into a company and contribute to a broader knowledge of the industry. This framework, shown in Figure 18, includes a

industry. This framework, shown in Figure 18, includes a concise company summary, target audience, business model overview, market position, price points, location and distribution channels, and their strengths and weaknesses. The online presence of all these brands has also been analysed and can be found in Appendix 5.

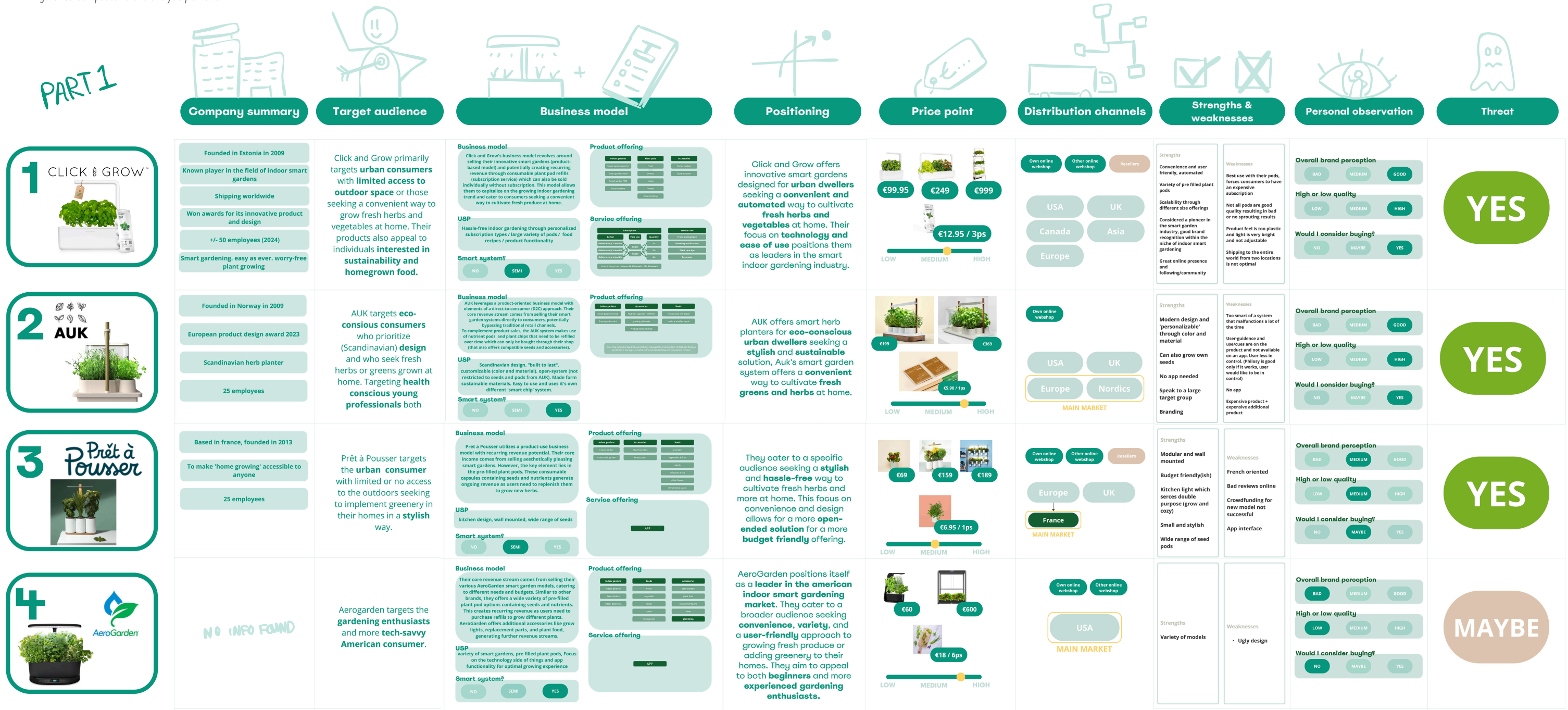
Through desk research on these companies, valuable knowledge was gathered to complete this framework. This allowed for the identification of strengths and weaknesses

across all brands and together with personal observations an assessment was done on the level of threat they pose to elho's potential entry into the market.










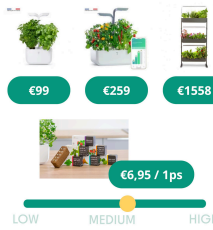

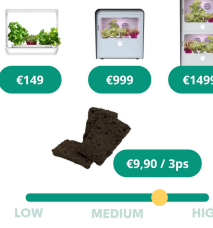

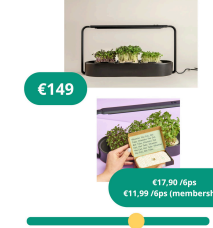
Figure 18 shows an extensive analysis of the selected brands, identifying three players that could pose a threat to elho's potential market entry. This threat is primarily driven by factors such as customer satisfaction with both product and service, geographic reach and shipping destinations, marketing and branding strategies, and pricing.

Competitors that pose a lesser threat typically do so due to lower performance in these areas or because their operational focus lies outside our target market. Brands that do not pose a threat are mainly characterized by low customer satisfaction and/or weak brand perception. An interesting player included in the analysis is Ingarden, which offers a distinct product focused solely on microgreens and scores high on all factors, especially on branding and marketing.

Figure 18: Competitor brand analysis framework



PART 2

 Company summary	 Target audience	 Business model	 Positioning	 Price point	 Distribution channels	 Strengths & weaknesses	 Personal observation	 Threat																							
<div><div>5</div><div>Véritable®</div></div>	<div>Veritable focusses on the environmentally conscious city and country dwellers who are looking for fresh healthy and local products with organic or known origins and reliable producers. For people who like to cook rather than to get their hands dirty when gardening.</div>	<div>Business model Veritable has a variety of autonomous indoor gardens some smarter than others. Their main revenue stream comes from their product sales but they also offer their way of pods, called lingots that consumers need to replenish every once in a while which creates a second revenue stream for Veritable. USP Organic and sustainable (seeds and soil + needed nutrients) compostable, biodegradable and not pesticides. Fresh herbs for culinary use appealing to home chefs. Smart system? <div>NOSEMIYES</div></div> <div>Product offering<table><tr><th>Product</th><th>Price</th><th>Availability</th></tr><tr><td>Veritable garden</td><td>€99</td><td>Available</td></tr><tr><td>Veritable lingot</td><td>€259</td><td>Available</td></tr><tr><td>Veritable lingot (mini)</td><td>€1558</td><td>Available</td></tr></table> Service offering<table><tr><th>Service</th><th>Price</th><th>Availability</th></tr><tr><td>Veritable garden</td><td>€99</td><td>Available</td></tr><tr><td>Veritable lingot</td><td>€259</td><td>Available</td></tr><tr><td>Veritable lingot (mini)</td><td>€1558</td><td>Available</td></tr></table></div>	Product	Price	Availability	Veritable garden	€99	Available	Veritable lingot	€259	Available	Veritable lingot (mini)	€1558	Available	Service	Price	Availability	Veritable garden	€99	Available	Veritable lingot	€259	Available	Veritable lingot (mini)	€1558	Available	<div>Véritable caters to design-conscious individuals who appreciate French flair and organic ingredients, focusing on herbs specifically for culinary applications for both city and country dwellers. Offering both indoor and outdoor gardens to grow your own.</div>	<div> €99 €259 €1558 €6,95 / 1ps LOWMEDIUMHIGH</div> <div><div>Own online webshopOther online webshop</div><div>Europe</div><div>France</div><div>MAIN MARKET</div></div>	<div>Strengths French market Organic and sustainable Indoor and outdoor (scalability) 70 kinds of seeds Easy to use pods</div> <div>Weaknesses French oriented Branding not catchy Not a lot of variety in product</div>	<div>Overall brand perception <div>BADMEDIUMGOOD</div> High or low quality <div>LOWMEDIUMHIGH</div> Would I consider buying? <div>NOSEMIYES</div></div>	<div>MAYBE</div>
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<div><div>6</div><div>rise</div></div>	<div>Rise gardens target tech savvy and health conscious consumers (family oriented) with large living spaces who want to grow every type of plant indoors.</div>	<div>Business model Similar to most business models, Rise gardens main revenue stream comes from their garden sales and offering seeds pods. However they also offer a membership which allows users to receive customized boxes, discounts, free shipping, exclusive product access and rewards (revealing points for each purchase to receive 'gifts'). USP connection with nature and loved ones, inspire to grow, teaching value of nutritious food Smart system? <div>NOSEMIYES</div></div> <div>Product offering<table><tr><th>Product</th><th>Price</th><th>Availability</th></tr><tr><td>Rise garden</td><td>€350</td><td>Available</td></tr><tr><td>Rise garden (mini)</td><td>€800</td><td>Available</td></tr><tr><td>Rise garden (large)</td><td>€1300</td><td>Available</td></tr></table> Service offering<table><tr><th>Service</th><th>Price</th><th>Availability</th></tr><tr><td>Rise garden</td><td>€350</td><td>Available</td></tr><tr><td>Rise garden (mini)</td><td>€800</td><td>Available</td></tr><tr><td>Rise garden (large)</td><td>€1300</td><td>Available</td></tr></table></div>	Product	Price	Availability	Rise garden	€350	Available	Rise garden (mini)	€800	Available	Rise garden (large)	€1300	Available	Service	Price	Availability	Rise garden	€350	Available	Rise garden (mini)	€800	Available	Rise garden (large)	€1300	Available	<div>Rise Garden positions itself as a versatile and user-friendly solution for a broad audience seeking the benefits of indoor gardening. Their focus on modularity, plant variety, and the ability to cultivate fresh produce appeals to both casual and more serious indoor gardening enthusiasts.</div>	<div> €350 €800 €1300 €12,50 / 4ps LOWMEDIUMHIGH</div> <div><div>Own online webshopOther online webshop</div><div>USA</div><div>Canada</div><div>MAIN MARKET</div></div>	<div>Strengths Targeting American people with room for a bigger product Growing beyond herbs due to size product Offering more than a product by including membership and reward systems</div> <div>Weaknesses Expensive Targeting people with big homes Very American oriented Very prominent in your home</div>	<div>Overall brand perception <div>BADMEDIUMGOOD</div> High or low quality <div>LOWMEDIUMHIGH</div> Would I consider buying? <div>NOSEMIYES</div></div>	<div>MAYBE</div>
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<div><div>7</div><div>CITYCROP™</div><div>AUTOMATED INDOOR FARMING</div></div>	<div>Citycrop is targeting tech savvy urban people with an interest in smart kitchen appliances and are looking for a local and fresh produce for their meals</div>	<div>Business model Similar to the rise gardens, citycrop's primary revenue stream is through their systems and seed pods. But also offer a subscription model for automated pod deliveries ensuring a steady supply the consumer who can track the growth on their app. USP automated convenience, mobile app control, smart kitchen, temperature regulated products, humidity control and odor neutralization for easy use. Smart system? <div>NOSEMIYES</div></div> <div>Product offering<table><tr><th>Product</th><th>Price</th><th>Availability</th></tr><tr><td>Citycrop garden</td><td>€149</td><td>Available</td></tr><tr><td>Citycrop garden (mini)</td><td>€999</td><td>Available</td></tr><tr><td>Citycrop garden (large)</td><td>€1499</td><td>Available</td></tr></table> Service offering<table><tr><th>Service</th><th>Price</th><th>Availability</th></tr><tr><td>Citycrop garden</td><td>€149</td><td>Available</td></tr><tr><td>Citycrop garden (mini)</td><td>€999</td><td>Available</td></tr><tr><td>Citycrop garden (large)</td><td>€1499</td><td>Available</td></tr></table></div>	Product	Price	Availability	Citycrop garden	€149	Available	Citycrop garden (mini)	€999	Available	Citycrop garden (large)	€1499	Available	Service	Price	Availability	Citycrop garden	€149	Available	Citycrop garden (mini)	€999	Available	Citycrop garden (large)	€1499	Available	<div>CityCrop positions itself as a convenient and technologically advanced solution for urban smart system enthusiasts seeking to cultivate fresh produce at home. Their focus on automation, climate control, app control, and potentially organic seed options caters to individuals interested in both convenience and a level of control over their indoor farming experience.</div>	<div> €149 €999 €1499 €9,90 / 3ps LOWMEDIUMHIGH</div> <div><div>Own online webshop</div><div>Europe</div></div>	<div>Strengths Climate controlled and tech advanced For a more serious and precise type of consumer who is really keen on the perfect growth and who likes to be in control Different type of product than the rest of the market</div> <div>Weaknesses Expensive Looks sketchy No branding or reviews</div>	<div>Overall brand perception <div>BADMEDIUMGOOD</div> High or low quality <div>LOWMEDIUMHIGH</div> Would I consider buying? <div>NOSEMIYES</div></div>	<div>NO</div>
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<div><div>8</div><div>IKEA</div></div>	<div>X</div> <div>X</div>	<div>Business model Not their main business, just a product in their product range. It is the most affordable option on the market but it does not come with any support, (smart) apps, subscription, soil pods. Therefore they are also able to apply this low cost price. USP Cheapest option on the market Smart system? <div>NOSEMIYES</div></div> <div>Product offering Just the product</div>	<div>X</div>	<div> €49 LOWMEDIUMHIGH</div> <div><div>Own online webshop</div><div>Nordics</div></div>	<div>Strengths Affordable Ikea brand name</div> <div>Weaknesses Plastic product More a seed starter than a garden. (small) Bright light No service No customizability No self timer in light</div>	<div>Overall brand perception <div>BADMEDIUMGOOD</div> High or low quality <div>LOWMEDIUMHIGH</div> Would I consider buying? <div>NOSEMIYES</div></div>	<div>NO</div>																								
<div><div>9</div><div>ingarden®</div></div>	<div>Ingarden is targeting consumers who take care of their bodies by living a healthy lifestyle or wanting to improve their health through healthy foods.</div>	<div>Business model Ingarden offers microgreen garden that run on hydroponics systems and have also an incorporated UV-grow light like the normal smart gardens. The system works with compatible seeds pads that need to be bought separately. USP Quick growth, health booster through nutrient-rich microgreens (superfood), Small and aesthetic product, product customizability Smart system? <div>NOSEMIYES</div></div> <div>Product offering<table><tr><th>Product</th><th>Price</th><th>Availability</th></tr><tr><td>Ingarden garden</td><td>€17,90 / 6ps</td><td>Available</td></tr><tr><td>Ingarden garden (mini)</td><td>€11,99 / 6ps (membership)</td><td>Available</td></tr></table> Service offering Membership/account to receive discounts on future orders</div>	Product	Price	Availability	Ingarden garden	€17,90 / 6ps	Available	Ingarden garden (mini)	€11,99 / 6ps (membership)	Available	<div>Ingarden offers a small microgreen garden which are known to grow fast, low in maintenance, easy to apply in lifestyle and healthy. This sets them apart from the bigger indoor smart garden players in this field. They have a bigger reach in target group because this product requires less space and is not compatible with outdoor vegetable gardens which is a competitive advantage for ingarden.</div>	<div> €17,90 / 6ps €11,99 / 6ps (membership) LOWMEDIUMHIGH</div> <div><div>Own online webshop</div><div>USA</div><div>Europe</div><div>Netherlands</div><div>Germany</div></div>	<div>Strengths Unique market Easy to use products with less risks Bigger market approach Different approach to grow your own Small product Flexible subscription Award winning design</div> <div>Weaknesses Expensive product Young and small company</div>	<div>Overall brand perception <div>BADMEDIUMGOOD</div> High or low quality <div>LOWMEDIUMHIGH</div> Would I consider buying? <div>NOSEMIYES</div></div>	<div>YES</div>															
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5.1.3 Competitors that have not survived the industry

An interesting finding from the external analysis is the unsuccessful entry of two well-known brands into the indoor gardening scene. Both Bosch and Miele attempted to infiltrate this industry but ultimately closed their operations. **Bosch's SmartGrow system**, which featured a smart watering pump system, service app, and compatible grow pods, was more advanced than many competitors, offering a comprehensive indoor gardening solution. Despite these features, Bosch ceased operations, leaving users with access only to spare parts and seed pods, while the app no longer supports the system. Specific reasons for discontinuing SmartGrow remain unclear. Canadian brand **AVA smart garden**, shown at number 6 in Figure 19, has also shut down operations in 2022. The cause of their shut down has also not been discovered.

Miele's Plantcube, developed by Agrilution, was an automated indoor vertical farming system designed to bring fresh, pesticide-free produce to households. Resembling a standard refrigerator, the Plantcube offered optimal growing conditions through regulated lighting, automatic watering, and a controlled micro-climate. Users could monitor the growth process via a dedicated app. Despite its innovative design and sustainable approach, Agrilution filed for insolvency in 2019 after a failed financing round. Miele acquired the brand and assets but eventually discontinued the product, as the market demand and financial sustainability did not meet expectations (Fresh On The Table With Agrilution: Miele Entry Into Future Field Of Vertical Farming, n.d).

These two well-known companies, renowned for their kitchen appliances, ventured into the indoor gardening industry but did not succeed. This could be attributed to factors such as market readiness, pricing, or product performance. Despite having the resources to establish a strong market position, they failed to sustain their operations in this new sector, highlighting potential challenges in consumer adoption and market viability.



Figure 19: Competitors which did not survive

5.1.4 Findings and observations from the competitive landscape analysis

Through the creation of the competitive ISG landscape, a comprehensive competitor brand analysis could be conducted, which has provided valuable knowledge into the ISG market. With an understanding of the industry and the brands operating within it, the following market insights have been identified.

Business model:

In general, all the **business models of these companies are very familiar**. Additional revenue streams come from supplementary products that help optimize the main product like pods, seeds, plant nutrition, and spare parts. Service elements, when present, include seed pod subscription models, supporting applications, memberships, reward systems, and support groups.

Online sales strategy:

These companies primarily sell their products online, either through their own webshops or online retailers. These online model offers benefits like avoiding high rental costs, aligns with the growing consumer shift towards online shopping, provides better customer insights through data analytics, and increases reach. **All of these companies, being relatively small in size, fall into the categories of small businesses or start-ups, either due to their recent establishment (between 2009 and 2017) or their niche market focus.** For these types of companies, operating an online business is often the most feasible option. However, the downside is that consumers miss out on the opportunity to physically interact with the product, which can impact consumer adoption and acceptance, as highlighted in the literature.

Areas of focus and brand personality:

Mastering all elements of running a business is challenging, especially for small businesses and startups. Each company excels in certain aspects, such as marketing, product development, or customer relations, but struggles to manage all elements effectively. One notable observation was the **lack of brand personality throughout all brands**. Clear slogans, taglines, sleek social media presence, the creation of a desirable lifestyle image, the 'fear of missing out' (FOMO) factor, and controversial branding or advertisements were largely absent across these brands. Our target group likely values these aspects, even though this observation is not directly supported by literature. Testing this could provide valuable insights when creating a launching strategy and marketing campaign.

Currently, there is **no (major) Dutch competitor** in the indoor gardening market, apart from the lesser-known brand 'growboxcompany'. This could indicate that these systems have not yet gained popularity among Dutch consumers, or that there is a lack of demand.

Emerging Trends:

An increasing number of brands are embracing the trend of **growing mushrooms indoors**. This could be the next step for this industry, given the rising popularity of mushrooms and their potential dietary benefits as highlighted by scientists (Bauck, 2023).

5.2 Consumer review analysis

To gain deeper insights into consumer perceptions and industry practices, an extensive analysis of consumer reviews for the selected brands was conducted. This analysis utilized real user experiences to identify areas where brands and their products and/or services may be lacking or excelling. The data was sourced from reputable review platforms, primarily Trustpilot, which is a trusted online review community connecting businesses and consumers through genuine feedback about their buying and service experiences. In cases where Trustpilot reviews were insufficient or absent, additional reviews were sourced from Amazon and Coolblue. A total of 905 reviews were collected and analysed. The qualitative data was examined using an inductive coding method, which involves reading and interpreting raw data to develop themes, concepts, or a process model based on the data (Kaluza, 2023).

5.2.1 Method

As illustrated in Figure 20, the coding and analysis process involved several steps. Firstly, all reviews were collected and categorized as a positive, neutral, or negative review based on their star ratings (out of 5). Reviews with recurring comments were marked (ranked) with a more saturated colour after being mentioned five times or more, highlighting their relevance. These recurring comments were considered particularly valuable. Following the initial classification, a thematic analysis was performed to group the codes into themes, each given a specific name. This process resulted in a set of insights, which are summarized on the next page. The full review analysis can be found in Appendix 4.

This analysis not only provided a deeper understanding of consumer perceptions of the products but also revealed the strengths and weaknesses of the brands operating in this industry. It highlighted common challenges and differentiators that help brands stand out. The insights gained from these reviews offer strategic guidance for optimizing and shaping the user experience across all aspects of the consumer relationship with the future concept.

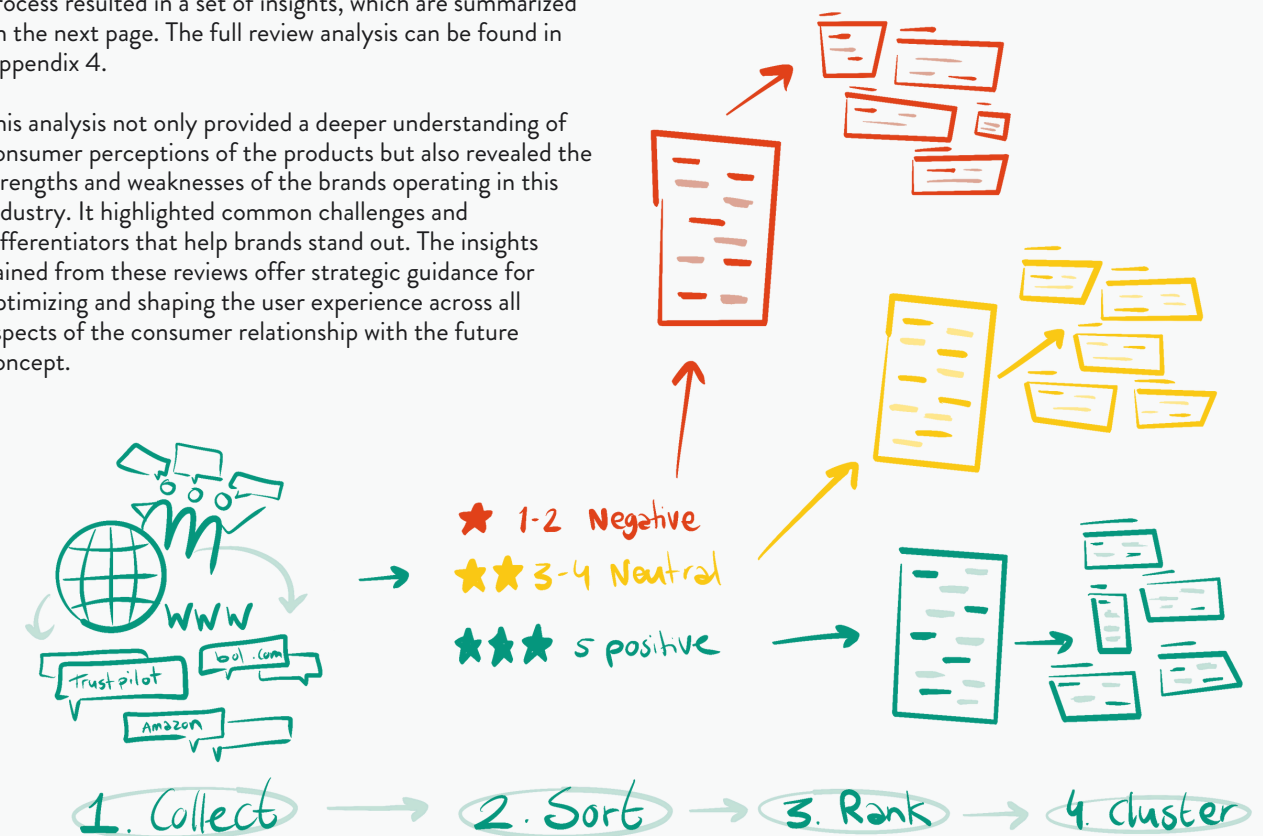


Figure 20: Review analysis process (Appendix 4)

5.2.2 Results review analysis

This section presents the results of a comprehensive analysis of consumer reviews on the selected ISG companies currently available on the market. The findings are categorized into negative, neutral, and positive insights, revealing key factors that influence customer satisfaction, expectations, and overall experience. The most impactful results are presented first.

Positive

- 1. Good customer service and support will lead to brand loyalty.** Your product may be good, but your customer service and the support offered are leading when it comes to brand loyalty, experience and trust in the product/company. It can effectively address any negative experiences customers may have with the product itself. Refunds, discounts on future orders, or additional support, often left positive reviews despite any issues. Consumers appreciate attentive details which make them feel seen and valued, such as thoughtful packaging, user-friendly apps, clear brand values, and well-designed instructions.



- 2. Emotional benefits:** Many consumers enjoy the process of growing more than the actual produce. Positive emotions mentioned include "having fun," "feeling proud," "joy," "confidence," and "motivation to cook." On a deeper level it also **helps consumers with their mental wellbeing**. It gives the perception of growth and accomplishment. Not being able to do gardening outside during the cold winter is being resolved (Consumers with physical limitations, therefore not being able to spend time outdoor as much, find comfort in maintaining indoor gardens).



- 3.** Product attributes and functional benefits that increase consumer satisfaction in the systems include **the ability to control the grow light and use it to light up a space**. Additionally, products that **enhance the aesthetics of a space contribute to greater product satisfaction**. The ease of setting up and using the system is often the most mentioned factor that results in a positive experience for consumers. Another important aspect is the availability of **assistance and support** through apps, experts, and customer service. Furthermore, the ability to have fresh, self-grown produce year-round is a functional benefit that customers initially expect, and when they experience it, it positively affects their satisfaction with the PSS.



Neutral

- 1. Price sensitivity:** Many consumers find the average price (175-275 euros) **too high** for what the product offers, especially considering additional costs for maintenance, pods, and other parts. Quote: "Quite expensive for a not 'sooo' smart system."



- 2. Lack of customization:** Most products offer limited design options, if any. Otherwise, it is mostly just based on colour (black or white plastic) or size (3 or 9 plants). **Consumers value products that blend well with their personal spaces and match their values**. The kitchen is the most preferred place for this product. Enhancing the customizability in the design would increase the customer acceptance rate.



- 3. Grow light issues:** Common complaints found in the reviews were about the integrated grow lights being **too bright, ruining ambiance**, and (some) running on non-customizable automated timers. Some products offer light control through app features which often experience technical difficulties. Additionally, the long lighting periods (up to 16 hours/day) disrupt daily routines.



Negative

- 1.** The expected counterpart of positive point 1: **Bad delivery and poor customer service** were the most frequently mentioned complaints across all businesses. Especially when a service is incorporated into your offering, good customer service is essential to gain a loyal customer relationship. Poor customer service enhances dissatisfaction, resulting in negative reviews and a reluctance to repurchase or recommend the brand. **The client is king and they must feel valued.**



- 2.** Many companies **struggle with delivering pods or seeds that guarantee 100% germination**. This was the second most common complaint. **Consumers expect flawless results in a 'controlled' indoor environment**. More than two germination issues per growth cycle can ruin the experience, especially when combined with poor customer service and high prices, leading to product abandonment.



- 3.** **High prices set high expectations** for the product, service, and brand. Customers expect premium service and flawless results when they pay a premium price. Any inconvenience, especially for first-time users, is met with dissatisfaction. Users may hesitate to buy replacement pods or nutrients if the product does not work as expected. They feel trapped by the cost, making supermarket greens a more appealing option, as the price for new pods often matches or exceeds that of fully grown and ready-to-eat greenery.



- 4.** **Poor design and build quality** also negatively affect perception, particularly at higher price points. Plastic components, especially when involving water reservoirs, are perceived as cheap or brittle. Overly technical features (perceived as risky and not trustworthy), unclear instruction manuals, or poorly designed websites further reduce trust, even if the product itself functions well.



- 5.** **Marketing a product as 'smart' can be misleading if it does not meet high-tech expectations**. Disappointment arises when the only difference between a 'classic' and 'smart' version is a Wi-Fi or Bluetooth feature that doesn't work reliably. Consumers feel overcharged for what is essentially the same product.



- 6.** **Mold, pests, or unhealthy-looking plants** (e.g., yellow or gloomy leaves) are significant deterrents. Consumers expect a controlled environment to produce perfect results. Even if these are natural occurrences, lacking this knowledge leads to dissatisfaction.



- 4.** **Online sales only:** Most brands sell exclusively online, which often leads to consumers being disappointed or surprised when seeing the product in person. Having products available in stores, through video reviews, or with hands-on experiences helps set realistic expectations and build trust. False advertising or 'risky' USP's which can't be met (e.g., plant height, year-round growth, and germination rates) can frustrate consumers. **Transparency is key in setting expectations to avoid consumer disappointment.**



- 5.** **New user insecurity:** For many consumers, growing indoors is a new and unfamiliar experience. Lack of clear guidance discourages new users and cryptic/vague information decreases trust in brands. Good assistance (e.g., via apps, expert access, community support, or an AI assistant) can build confidence and reduce simple inquiries to customer service.



- 6.** **Limited seed variety:** a view consumers feel restricted by the types of seeds offered (mostly herbs, lettuce, and flowers). There is a desire for more variety, such as fruits (berries) which are currently not being offered by any of the brands. Another remark is that mall vegetables like cherry tomatoes and peppers, often don't yield satisfactory results compared to their lengthy growth times.



5.3 Hands-on user testing through the eyes of a designer

To gain an even more comprehensive understanding of ISG products, product tests were conducted with three types of systems. These tests involved a hands-on examination over an extensive period to provide in-depth insights into the various ISG systems. The three systems tested include:

The three systems tested include:

- A very low-budget, non-smart ISG system: an **Action DIY grow kit**.
- A solely product-oriented ISG without any additional services or guidance: **IKEA's NYSATTRA**.
- A 'smart' system, which includes a service and an app: the **Click and Grow smart garden 9** (recognized as the biggest competitor in the industry according to the competitive landscape).

These tests were approached from both a consumer's perspective and a designer's critical viewpoint, allowing for a deeper level of analysis. These tests delivered insights into consumer (mis)perceptions, user experiences, brand

experiences, achievable results, points of improvement, and overall compatibility. While many insights were obtained from the previous review analysis, this subchapter highlights new, relevant information and emphasizes findings that require additional attention.

This analysis will present specific findings for each individual product first, followed by general insights relevant to all products.

ACTION



INSIGHTS

Product performance

The coconut soil pack lacked the necessary nutrients for plant growth, resulting in stunted growth after sprouting. Moreover, the sprouting itself was disappointing, with a very low rate of seeds that successfully sprouted.

Information provision

The packaging provided minimal instructions, leaving users unsure about how to properly nourish the plants and the appropriate amount of water needed for optimal plant care.

Price-performance mismatch

Not only were the price and brand reputation low to begin with, but the overall performance of the product was even worse than expected. This led to dissatisfaction and no tangible results to work with.



Result after 6 week...

... No Success

INSIGHTS

Poor aesthetic, cleanliness, and tangling issues

Potting the baskets yourself results in a mess, and the design allows roots to become entangled throughout the entire watering tank, making it difficult to maintain and handle individual plants. The open baskets cause the soil to be in constant contact with the water, resulting in dirty, smelly, and brown water. This negatively impacts both the appearance and functionality of the system.

Insufficient growing space and poor germination

The spaces designated for greenery are too small, leading to stunted plant growth and an overall disorganized appearance when 'fully' grown. Germination rates are low, with half the seeds failing to sprout or grow properly. After two months, the yield is insufficient, producing only enough for half a salad, indicating suboptimal growing conditions and lack of guidance.

Lack of instructions

The product provides no guidance on usage, maintenance, or optimal soil and materials. There are no instructions on planting, nourishing, or harvesting, leaving consumers to guess how to operate the system. Additionally, there is no information on where to buy compatible pods or seeds.

Cost vs. performance

Despite being relatively cheap, the product's performance is poor, especially when compared to the Click and Grow system.



difficult to repot

total harvest...



Dirty



planted 2nd June



tiny



failed



tangled roots

Result after 6 weeks (14 July)

INSIGHTS

Lack of user engagement

The product setup is exceptionally easy, requiring minimal user actions. However, this simplicity diminishes the sense of participation and engagement during the initial setup, leading to a less enthusiastic user experience. Whereas the IKEA effect, the phenomenon that suggests that people attribute more worth and attachment to items they have invested effort in assembling or customizing, leading to increased satisfaction and willingness to pay more for such products (Norton et al., 2012), would increase engagement.

High cost of pods

The pods are relatively expensive compared to pre-grown herbs available in supermarkets, making the ongoing cost of using the system higher than anticipated.

Limited smartness

While not having to water the plants constantly is a significant convenience, the system requires users to check the water tank levels manually. The lack of smart alerts for low water levels reduces the overall convenience therefore the 'smartness' is not represented well in this model.

Ineffective app engagement and user experience

The app associated with the system is basic and lacks engaging features, primarily tracking growth time and providing optimal growing information and pod reordering options. Due to the slow growth process, there is no urgency for users to frequently check the app, leading to neglect and forgetting its existence. This results in minimal interaction between the app and the consumer, diminishing the overall user experience and causing the product to become neglected over time.

Positive watering system performance

The watering system, utilizing transmitting wicks, performed better than expected. This method proved effective in maintaining plant health, suggesting potential integration opportunities with other elho products.



5.3.1 General observations product testing

Written below are additional observations that have been made during testing. These observations apply to all the tested products and have not been mentioned in the results retrieved from the review analysis.

Limited longevity and inadequate space for growth

One significant drawback of these systems is their inability to offer ample space and resources for plants to thrive over a prolonged period. As the soil's nutrients diminish and the plant roots suffocate due to limited space, repotting or transferring the plants outdoors becomes necessary. This contradicts the idea of effortlessly growing plants indoors and requires additional time, space, and effort for maintenance increasing the chances of plants failing to fully grow to their full potential. The small pods quickly become inadequate for the plants, leading to either stunted growth or a significant slowdown, thereby diminishing the convenience that ISG systems are meant to provide.

Optimal growth conditions for herbs versus vegetables

These systems tend to perform best with plants that grow quickly and provide immediate results, such as herbs, rather than vegetables. Slow-growing plants can lead to a sense of dissatisfaction among consumers, who may feel that the effort and resources invested yield minimal results. This realization can cause users to question the long-term practicality and satisfaction of using these systems.

Synchronization of planting cycles in combination with maintenance

For optimal results, all plants should be planted simultaneously. Mature plants can overshadow new seedlings, depriving them of necessary light and significantly reducing their growth. This synchrony is also practical because nutrients in the pods typically deplete around the same time, necessitating a new planting cycle.

The systems require a deep cleaning to remove algae and mold once in a while and is made difficult when not all growth is ready for harvesting. This maintenance issue can be a critical factor leading to users discontinuing the use of the product.

Lack of engagement and connection

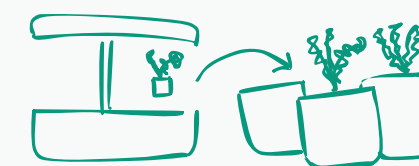
The lack of a personal connection with the product after the initial setup is a common drawback. Users often miss engaging reminders and a sense of personalized interaction, which can result in neglecting the system.

Unclear purpose for harvested plants

There is often no clear guidance on how to use the harvested greenery, especially herbs. While herbs are beneficial, they are specific in use, and users may lack the knowledge or motivation to incorporate them into their diet effectively. The absence of prompts or recipes to utilize the herbs can reduce the perceived value of the system.

Seed planting challenges

Planting pods and seeds manually can result in a higher rate of malfunction, with seeds failing to sprout compared to pre-prepared pods. This issue underscores the need for compatible, ready-to-use pods to ensure a more consistent and successful growth experience.





Lifestyle-focused branding:

By highlighting the lifestyle benefits of indoor gardening, elho can **build a strong emotional connection** with customers. This is crucial for introducing the system to the market, where it's not yet recognized. Elho could also **position itself as a plant care partner**, offering a full solution beyond this PSS. This may open opportunities for additional plant care services that consumers need, according to research conducted by 'the Conversation Studio' in 2022/23.

5.4 Opportunities and Threats (SWOT)

Continuing the SWOT analysis. The opportunities and threats for the company got collected by the understanding of the external market analysis (Figure 16B).

5.4.1 Opportunities

Building on brand recognition and expertise



Leveraging brand equity for innovation:

Consumers associate elho with plants, providing a **strong foundation for brand awareness and trust** in the new PSS. Existing product lines can serve as a springboard for developing innovative features and functionalities within the PSS, helping shape the product and making it truly elho. This contributes to increased brand recognition and strengthens the PSS value proposition, an advantage other brands didn't have when entering the industry.

Established network advantage:

Elho's network of partners and its strong brand provide a competitive advantage. This allows them to **outcompete startups** by attracting partners and, if needed, investors who can offer additional resources and support in the PSS launch and growth.



Weaknesses of competitors:

Many businesses in the ISG field are **small businesses or startups** with limited resources compared to elho's infrastructure. Reviews of competitor PSS offerings highlight the risks of PSS models, where weaknesses in product quality, customer service, and global reach are harder to manage.

Potential for disruption by established brands:

The market is dominated by smaller players, but the entry of established brands like Zara, HEMA, and Action into related markets shows potential for indoor gardening products. The success of Albert Heijn's 'moestuintjes' since 2015 (Medema, 2022) emphasizes this.

Market opportunity and differentiation

Early mover advantage:

Most competitors in the smart indoor gardening space **haven't achieved full market penetration** worldwide, especially in the Netherlands. This gives elho a chance to establish itself as a leading player in this new segment, starting in the Benelux region. Though GrowBoxCompany (a Dutch ISG brand) recently launched, it is a very small competitor, giving elho an **early-mover advantage**.



Differentiation through design:

Many competitors in the smart indoor gardening space share similar offerings. While some offer more extensive services, product functionalities and aesthetics are very similar. **This lack of customizability presents a significant opportunity for elho**. By focusing on user needs and offering a more customizable and design-oriented approach, elho can differentiate itself and appeal to a wider range of customers.

Pricing strategies for early adopters:

Many competitors offer products at premium prices, averaging around 225 euros. By pricing the elho PSS at a more accessible level, the company can attract new users hesitant to invest in a new concept. In a market where brand recognition is still growing, **price is a key decision-making factor**, and a more attractive price can accelerate ISG adoption.

Social Media Engagement and Lifestyle Marketing

Harnessing the Power of Social Media:

Elho can use existing **social media platforms and expand its presence** on TikTok to reach its target audience and create awareness for the PSS beyond current users. User-generated content can drive product reviews, helping with adoption, awareness, and demand for the PSS, something competitors are not doing, though it's proven to increase brand equity (Perera et al., 2023).



Figure 16B : SWOT model

5.4.1 Threats

Challenges of entering /adding a new business model

Elho's PSS presents an all-or-nothing opportunity:

While it offers potential for growth, entering this new business model requires careful planning. Underestimating the complexity of launching a PSS, compared to a product introduction, can lead to failure. Elho must offer a service and product bundle that matches or exceeds competitors, including core functionalities and differentiated features. Integrating service elements with existing product lines may **require significant changes** to processes, logistics, and IT infrastructure, demanding considerable time and resources. This ISG PSS is not an easy first attempt into the service industry.

Customer service and good user experience are crucial

Reputation management:



Poor customer service can harm brand reputation through negative reviews. A dedicated customer service strategy is essential to address concerns and build brand loyalty. Strong support, especially early on, is crucial for PSS success.

Scaling customer support:

Elho must ensure its customer service team is ready to handle increased demand. **Weak support can lead to user frustration and product abandonment**.

Performance of seeds can be dealbreaker:

Poor seed germination or inconsistent results can cause negative user experiences and distrust, especially given consumer expectations of flawless natural growth.

Product perception

Plastic perception:

The use of plastic could be seen as cheap, especially at a high price point.



Balancing functionality with aesthetics:

The necessary UV light could disrupt ambience. Elho should design solutions to mitigate this and potentially turn it into a unique selling point.

Nature in ISG is expected to be perfect:

Consumers expect nature to grow perfectly in a controlled environment. However, indoor plants can face challenges. Elho must **manage consumer expectations** as nature is unpredictable, which could affect brand trust.



Product awareness

New product category:

Consumer awareness of ISGs is low. Elho needs to introduce its product but also educate the market about its benefits. Launching a new product category is risky, and a poorly received PSS could hurt elho's brand reputation.

Difficult to operate in large areas (across borders)

Challenges across borders:

Brands in the ISG space face challenges expanding across borders, likely due to logistical complexities and regulatory hurdles. Additionally, competition is fierce, with most brands **targeting the same urban demographic**.



06

UNDERSTANDING THE TARGET GROUP

EMPIRICAL RESEARCH



This chapter dives into the mindset of the target group within the context of the project. A combination of desk research and qualitative semi-structured interviews have been combined to draw useful insights that help with understanding how the selected target group perceives PSS. The understanding of the target groups' (latent) needs and preferences towards PSS is helpful when creating the right value proposition and will uncover key insights that will serve as design drivers during the development process.

Chapter objectives:

1. Uncover the core values of this target group/generation which will help with defining the possible focus of the PSS and in creating an appealing strategy.
2. Identify the target group's needs, preferences, and perceptions towards adopting (new) PSS.
3. Gain insights from the target audience's opinions and perceptions about the current state-of-the-art ISG concepts based on the findings of the external analysis and with the use of the theoretical framework developed through the literature review.

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- 6.1 Introducing the target group
- 6.2 Empirical research
 - 6.2.1 Research methodology
 - 6.2.2 Interactive consumer behaviour interview setup
 - 6.2.3 Data collection
 - 6.2.4 Data analysis
- 6.3 Results
 - 6.3.1 Values through consumer buying behaviour
 - 6.3.2 Consumer perception towards existing PSS
 - 6.3.3 Consumer perception towards ISG
 - 6.3.4 Target group and other interview insights
 - 6.3.5 Adoption perceptions between known vs. unknown PSS
- 6.4 Coding results
- 6.5 Key takeaways and design drivers
 - 6.5.1 Key Takeaways
 - 6.5.2 Design drivers



6.1. Introducing the target group

As mentioned in the introduction the key target group elho wishes to reach Young Urban Professional (YUP), also known as Yuppies, living in the Benelux (Belgium, Netherlands, Luxembourg) region with this new concept. Within the context of urban living and evolving consumer trends, young urban professionals (YUPs) represent a dynamic and influential demographic segment characterized by their distinct lifestyle preferences, consumption patterns, and socio-economic status (Halton et al., 2021). As a key target audience for various industries, understanding the values, needs, and motivations of Yuppies is key for developing a tailored product-service solution that resonates with their way of living.

Young Urban Professionals

YUPs are generally individuals aged 25 to 35 who live in urban or metropolitan areas, work in professional industries, and have a higher level of education and disposable income (Fromm, 2020). They seek convenience, and sustainability (Ziesemer et al., 2021), and quality of life in their daily purchasing behaviour and seek products and services that align with their values and aspirations (Ziesemer et al., 2021). Given their busy lives, YUPs often struggle to balance work, social commitments, and personal interests. This means they have limited time and seek efficient solutions that enhance their urban lifestyle. Furthermore, YUPs have a strong affinity for technology. They embrace digital platforms and smart solutions that simplify their daily routines and enable them to live more sustainable and fulfilling lives (Gregoire, 2024).

It is important to note that the term "YUP" is not officially recognized in the academic world. However, in the present day and age (2024), it refers to two distinct generations: Millennials (also known as Gen-Y), born between 1981 and 1996 (currently aged 28-43), and Generation Z, born between 1997 and 2012 (currently aged 12-27) (Wagatha & Chen, 2023). However, for our purposes, focusing on the target audience in 2030 reveals a near-equal distribution across these two generations. This specific group, a micro-generation resulting from the convergence of Millennials and Gen Z, can be described by the portmanteau term "Zillennial." If we depict the YUPs within this micro-generation, we refer to them as "yuzennials".

By delving into their distinct lifestyle and mindset, this thesis aims to uncover their most important consumer values and other insights that inform the design and development of our product-service system tailored to meet the unique needs and preferences of our target group.

Zillennials

Zillennials are caught between two quite distinct generations' experiences and are born approximately between 1993 and 2001 (making them currently 23-31 years old as of 2024) (see Figure 21). They are stuck between the 'digital-first environment' that defines Gen Z and the 'analogue era' that Millennials remember with fondness (Francis & Hoefel, 2018). Blending these two experiences into one makes them adaptable and comfortable navigating both in the physical and the online world.

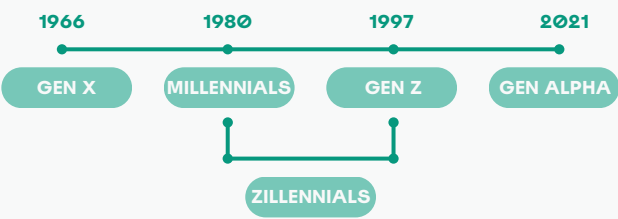


Figure 21: Zillennials microgeneration

Values specific to millennials

Millennials, now in their prime earning and spending years, are characterized by their pursuit of experiences over material possessions, a tendency toward thriftiness, and a preference for authenticity and social consciousness. They prioritize convenience, sustainability, and quality of life in their purchasing decisions, often looking for brands that align with their values and aspirations (Wagatha & Chen, 2023).

Values Specific to Gen Z

Gen Z, the first generation of lifelong digital natives, seeks value specifically in creativity, aesthetics, curiosity, and technological integration (Wagatha & Chen, 2023). They expect brands to offer innovative, user-friendly products and seamless digital experiences. Social justice, environmental sustainability, and ethical sourcing are crucial

to them, and they often support brands that reflect these values (Fromm, 2020; Wagatha & Chen, 2023). Gen-Zers value authenticity and individual expression, using social media channels for inspiration and research tools to help curate their online personas (Kastenholz, 2022).

Overlapping Values Between Millennials and Gen Z

Both Millennials and Gen Z share several values that significantly shape their behaviour. One of the most prominent ones is their strong commitment to social impact and sustainability. Both generations actively seek out brands that promote ethical practices and demonstrate environmental responsibility, aligning with their values (Dobre et al., 2021). Authenticity and individuality are equally crucial to both Millennials and Gen Z as both generations gravitate towards products and services that cater to their unique identities and allow for self-expression (Francis & Hoefel, 2018). This preference stems from their desire to showcase their personal values and distinctiveness, rather than conforming to societal norms (Shandrokha, 2023).

Tech-savvy by nature, both generations expect brands to integrate digital solutions that enhance their everyday lives. Transparency and accountability, particularly concerning data privacy and corporate social responsibility, are highly valued within brands. In addition, they prioritize brand experiences over material possessions. They are drawn to brands that provide meaningful and interactive user experiences, as well as personal interactions (Wagatha & Chen, 2023).

Both generations are shifting towards business models that value access over ownership. AB-PSS offerings align with their desire for flexibility and convenience, often preferring the use of services to the ownership of products (Francis & Hoefel, 2018). Millennials and Gen Z are shaping the consumer world and urging brands to do good, that help express themselves, and that can offer new experiences through the use of technology. Brands that have similar values will be the ones that attract zillennials as consumers the most.

6.2 Empirical research

6.2.1 Research methodology

Testing consumer behaviour among 'yuzennials' will be conducted through qualitative method through interactive semi-structured interviews. This method is preferred for collecting data when the study aims to delve deeply into participants' experiences and gain their unique perspectives. By using a flexible approach while keeping a focus on the study's overall objectives, semi-structured interviews allow for a more thorough understanding rather than a general understanding of the context (Omolola, 2021). Through this research technique, the aim is to gain a comprehensive understanding of participants' perceptions, values, opinions, preferences and needs on both a generic level as well as specifically towards the context of this thesis: indoor smart gardening.

The interviews were conducted using an online interactive setup, incorporating various exercises to guide the interview and provide inspiration and knowledge to ease the conversation. The participants were not informed about the interview's context beforehand to minimize potential bias.

Following approval from the Delft University of Technology Human Research Ethics Committee, data was collected from 11 participants fitting our target group of young urban professionals. Prior to the interviews, all participants were informed about potential risks and their rights via a digital consent form, which they signed through the same online tool.

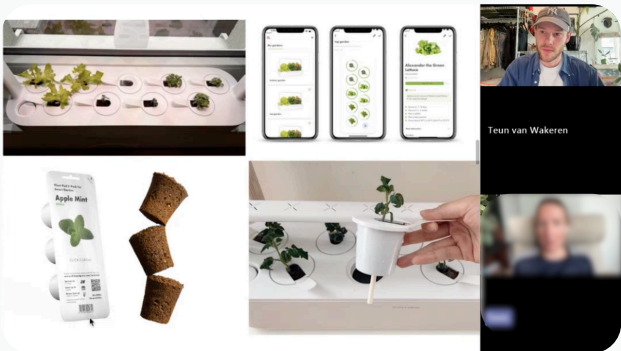


Figure 22: Online interviews

6.2.2 Interactive interview setup

The interactive interview has been carefully designed to gather relevant knowledge within the given context. The complete interview protocol including an explanation can be found in Appendix 6. It outlines the objectives, exercises to test adoption barriers, and a series of questions and sub-questions. The questions asked in the interview were based on the created conceptual model. The interview setup has undergone multiple iterations and testing with a test subject to refine and modify it before conducting the actual interviews.

- The overall objective of this part of the thesis was to:
- Understand the target group values through consumer behaviour
 - Test preferences and opinions towards (known) PSS
 - Get insights into the target group's opinions on the concept of ISG, their preferences, perceptions, needs, and wishes

The interview protocol was split up into 2 parts. The first part focused on the first 2 objectives and the second part on the last objective.

A simplified setup up of the used template is shown in Figure 23.

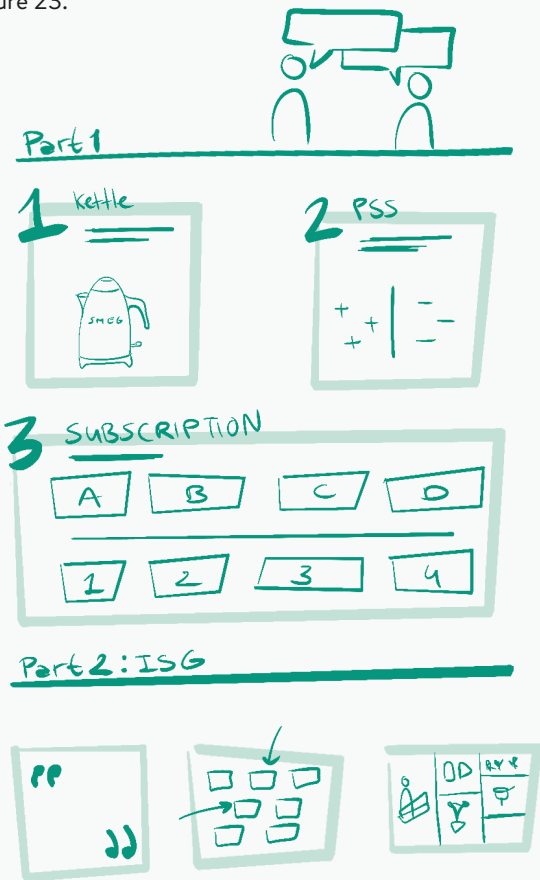


Figure 23: Simplified interactive interview setup

6.2.3 Data collection

The data collection process was designed to ensure a diverse and representative sample of the target group, known as YUPPIES. Participants were recruited through my personal network, ensuring a balance of male and female participants and a wide range of all ages within the chosen target group. Special attention was given to household compositions, actively including participants within the target group who had small children to gather diverse perspectives.

The interviews were conducted online via Microsoft Teams (Figure 22) between May 13th and May 20th, each lasting approximately one hour. The choice of an online platform facilitated screen sharing, allowing both the participant and interviewer to view the same materials, thereby minimizing confusion about the context of the questions. The interviews were conducted in Dutch, the native language of all participants, which helped them articulate their thoughts more easily and created a comfortable and open environment to talk freely. This approach aimed to achieve a higher level of understanding.

To maintain privacy, the participants' names are made anonymous in the presented data shown in Figure 24. The sample size was determined in consultation with the supervisors and aligns with the findings of Guest et al. (2006), who suggested that 12 interviewees are sufficient before reaching data saturation.

The interviews were semi-structured, allowing for flexibility in asking follow-up questions that deviated from the prepared script. This flexibility enabled a deeper exploration of the participants' thoughts and insights. Both audio and video of the calls were recorded and automatically transcribed to ensure accuracy in capturing the data. The Dutch transcripts were then translated into English and results are provided in the following subsections.

Participant	Gender	Age	Residing in	Living situation	Occupation	Working since	Date interview	Duration interview
1	M	1996	Amsterdam	Living with partner	Logistic analyst	2023	13/05/24	1h 5m
2	F	1996	Rotterdam	Living with roommate	Project analyst	2022	15/05/24	1h 12m
3	F	1997	Amsterdam	Living with partner	Marketer	2022	15/05/24	1h
4	F	1999	Rotterdam	Living with roommates	Civil Engineer	2024	16/05/24	1h 8 m
5	M	1997	Rotterdam	Living with roommate	Software Engineer	2024	16/05/24	49m
6	F	1995	Amersfoort	Living with partner	Nurse	2017	17/05/24	57m
7	F	1997	Amsterdam	Living with roommate	Asset servicing	2023	17/05/24	1h 3m
8	M	1998	Amsterdam	Living with roommates	Chemical Engineer	2024	17/05/24	50m
9	M	1996	Amsterdam	Living alone	Project manager	2022	20/05/24	1h 1m
10	M	1991	Soest	Living with partner and child	M&A manager	2015	20/05/24	1h 5m
11	F	1989	The Hague	Living with partner and children	Strategist	2013	20/05/24	1h 8m

Figure 24: Participant data

6.2.4 Data analysis

To extract meaningful insights and information from the data, a combination of different analysis techniques was employed. These techniques included observations, dot voting, clustering, and coding. The multi-faceted approach used in this study allowed for a thorough understanding of the data, which ultimately led to the results.

The interactive interview included specific exercises and questions which offered a clear framework for analysing the participants' responses. By segmenting the interview into various parts, the analysis process became more manageable and systematic. The participants' answers were categorized and visualized, allowing for the identification of clusters of similar quotes, which informed the study's conclusions.

The transcripts from the interviews, which focused on the context of ISG, were assessed through detailed coding to uncover perceived adoption barriers formulated in the literature review. The use of the digital research software tool Atlas.Ti was used in this process, offering structural guidance and helping to achieve accurate and organized results. This software also facilitated the visualization of the importance of various factors cited across all 11 transcripts. As each transcript was reviewed, relevant quotations were labelled, and quotations that offered further insights into the motivations of the participants were highlighted.

Thematic coding, a common method for analysing qualitative data, was used to identify recurring themes in the text by examining the meaning of words and sentence structures. Since a list of adoption barriers was already defined through the literature, deductive coding was used. Deductive coding, also known as concept-driven coding, ensures a focused analysis (Auerbach & Silverstein (2003). In addition to deductive coding, an open-coding technique was also employed to identify new adoption barriers relevant to the study that were not found in the literature.

6.3 Results

6.3.1 Values through consumer buying behaviour

Key insights into the consumer behaviour of young urban professionals (YUPs), specifically their values when selecting products, were discovered through the "kettle exercise" (explained in Appenix 6). The findings can be categorized as follows:

Popularity of the SMEG kettle

The SMEG kettle emerged as a favourite among the target group, symbolizing taste, wealth, design, and quality. It was popular among young professionals who were willing to invest in durable and aesthetically pleasing products that reflect their transition into adulthood. Interestingly, both new and second-hand SMEG kettles were sought after. The second-hand option was attractive to people who appreciate the design but were more price sensitive. It offers a balance between desire and affordability. The kettle was popular among both men and women.

'Best in test' category

Another well-represented group included consumers who made their choices based on online recommendations and reviews. For these individuals, quality is associated with material finish, brand reputation, reviews, and price. Participants in this group prioritized functionality and reliability, often selecting products that matched with their kitchen's aesthetic (e.g., black and metal finishes) and fell within a reasonable price range. The preferred shopping platforms for these consumers were Bol.com and Coolblue, indicating a high level of trust and familiarity with these retailers. The "best in test" label on these sites influenced their purchasing decisions, underscoring the importance of brand trust and positive past experiences.

Focus on attributes and functionality

The third category included consumers who prioritised specific product attributes and functionalities, often aligning their choices with their kitchen aesthetics and practical needs. Brand reliability remains a critical factor in their decision-making process. These consumers are very careful when it came to product features and often looked for items that provided a good balance between style and practicality.

Generational differences through income

The study found no significant gender differences in kettle preferences. However, the SMEG kettle was more frequently chosen by participants with longer working experience, likely due to increased spending power. On the other hand, newly employed individuals showed a preference for second-hand options, suggesting that Gen-Z values sustainability while Millennials prioritize quality.

Key consumer values

The responses were coded, categorized and analysed which revealed that product attributes/aesthetics, price, and trust are the most dominant values for this target group. Additional important factors included perceived quality, sustainability, and brand awareness. Other general observations included:

- **Product aesthetics:** These are crucial since the kettle is a visible item in homes, affecting both emotional benefits and social influence.
- **Brand association:** Brands known for quality tend to be red, and this perception is further strengthened when the product also showcases superior finishes where, for kettles specifically, metal is perceived as sturdier and more durable than plastic.
- **Price sensitivity:** Price only influences the people who don't have a strong preference for a kettle. Socially influenced individuals prefer the SMEG kettle, associating it with status, modernity, and good taste.



6.3.2 Consumer perception towards existing PSS

None of the participants currently owned a PSS within their household (note that basic PSS, such as internet, phone, and streaming services, were not considered in this context). Those who had previously used such systems, like leasing washing machines, HelloFresh, or Swapfiets, have all discontinued their subscriptions. The main reason mentioned was due to increasing costs. Participants pointed out that PSS models tend to become more and more expensive, which reduces their interest. Furthermore, they were not fond of the lack of flexibility that comes with subscription models. This diminishes the appeal of these systems, despite their convenience and usefulness.

Participants who had experience with PSS also felt that they were overpaying for services they rarely needed. For example, while they paid for maintenance and repair services, they rarely encountered broken products, making the expense seem unnecessary.

Participant 5: "I'm currently paying for a washing machine subscription with the reason that if it breaks down it gets repaired or replaced. But in three years it has never broken down so in the end I am overpaying for no reason."

In the end, people considered owning a product to be more cost-effective and appealing compared to paying a monthly subscription for rarely needed benefits.

For a PSS to sustain a long-term consumer interest, it must address a specific need or problem worth paying for. However, increasing prices diminishes consumer motivation and trust in the product and the company.

Consumer preferences in existing in-house PSS models

Ownership vs. Subscription

Consumers have a strong preference for owning a product rather than leasing it. Many participants expressed a desire to own the products they pay for, stating

"If I pay for it, I would like to own it" and "If I have the money for it, I buy it".

This preference is based on a general aversion towards monthly payments through subscriptions, which are seen as restrictive and inflexible. Participants often mentioned feeling "trapped" in a subscription, with comments emphasizing a lack of freedom and control.

Membership models

The concept of paying for a membership which included a product for free seemed to be perceived as more attractive compared to the traditional subscription models. Participants liked the idea of getting a free product right away but became more hesitant towards higher additional monthly costs. Many people stated that they would switch to a regular subscription or completely cancel their subscription after the contract period ends. With the main reason being to avoid the perceived financial burden.

UNDERSTANDING THE TARGET GROUP

Participant 3: "Without a subscription, I have complete freedom to decide how much I spend each month on coffee. One month I might drink 50 cups, the next 100. Not having to worry about adjusting a subscription gives me peace of mind."

Long-term subscriptions

Long-term subscriptions were only preferred if the costs were comparable to owning and if they provided a similar sense of freedom and flexibility. The ease of use and support services were important factors influencing this preference. Participants favored subscriptions that included maintenance, repair, and support services, mainly because their experience with these types of products (kitchen appliances) are considered essential and frequently used household items subject to wear and tear over time.

Cost sensitivity and perceived value

Cost was a significant concern, with participants seeking the cheapest options. They were willing to consider subscriptions only if the additional services offered substantial value and convenience. Many preferred to pay for expensive appliances upfront, describing it as "ripping the band-aid off" to avoid the recurring financial "hurt" of monthly payments. Ownership was preferred not only for financial reasons but also because the coffee machine is viewed as a crucial home appliance with significant daily value (something specific towards well-known consumer product).

Perception of subscriptions

In general, subscriptions were perceived negatively, associated with limitations, lack of control, and lack of flexibility. Participants emphasized the need for a sense of freedom in PSS, wanting to feel in charge of their preferences without feeling exploited by the company. This aligns with Kuusisto (2018), who found that consumers are concerned about subscription-based PSS models, particularly regarding uncertainty, potential hassle, and emotional burden. This finding is supported by Kuusisto's (2018) research, which discovered that consumers have concerns about subscription-based PSS models. These concerns specifically relate to uncertainty, fear of inconvenience, and emotional burden. Subscriptions were only attractive if they addressed specific, existing problems, such as "forgetting to buy coffee". For those without this issue, the appeal of subscription models was minimal. This further highlights the importance of experiential value in PSS offerings, where consumers expect tangible benefits and a reduction in perceived costs to justify their commitment to a subscription (Kuusisto, 2018).

Trust and experience

New users of PSS were hesitant to commit to subscriptions without first understanding their needs and preferences. They preferred to experience the product before considering an additional subscription. On the other hand, experienced users who chose not to subscribe argued that they already had a habit of buying coffee and did not see enough added benefits from a subscription that would justify the cost. There was also a general sense of mistrust towards brands that offered subscriptions, with many participants doubting their reliability and fairness towards exploiting consumers.

6.3.3 Consumer perception towards ISG

Product related insights

Participants were asked to evaluate and rank various ISG systems from best to worst while thinking out loud. Figure 25 highlights the top 3 most and least preferred systems based on their perceptions, a more elaborate explanation can be found in Appendix 7.

Natural aesthetics

Participants, rightfully, associated "indoor garden" with nature and plants, preferring designs where plants are the focal point, similar to houseplants where pots are secondary. They disliked products that appeared too futuristic or technical, favoring understated, well-designed items that blend into their home interiors. Natural materials like wood were seen as ideal for creating a harmonious garden-like atmosphere.

Customization and personalization

Customization to fit individual preferences and interior designs was highly valued. Participants noted that products must fit into specific spaces in their homes. Features like wall hanging, modularity, and adjustable sizing were seen as beneficial. Offering various colors and material finishes would improve product appeal and make consumers feel unique and more proud to own this product.

Aesthetics and size

Aesthetics were the most crucial product feature. Products should be designer eye-catchers for kitchen countertops, complementing the space without disrupting it. Participants were positively surprised by the size of the products which was smaller than they expected, this is already beneficial for adoption in urban living spaces with limited room.

Organized through calmness

Participants preferred systems with neatly arranged, separated plants, which allow easy replacement and create a calm, organized feel. Overgrown or tangled plants were viewed negatively. The product should evoke a neat, well-maintained garden allowing them to take pride in showcasing the achieved growing results.

UV Light concerns

What was already confirmed from the review analysis is the concern about the UV grow light. Participants were concerned that UV grow lights would disrupt their home ambiance due to harsh lighting. There were also worries about energy consumption and high operational costs, linking this to unsustainable behavior, which should be carefully considered as a selling point.

Service related insights

App offerings and payments

Participants generally prefer not to commit to monthly payments, however small monthly fees for app functionality were more accepted. The app should enhance ease of use, performance, and emotional benefits, offering learning tools and support. If the app only runs the product without extra value, consumers lose interest.

Pricing perceptions and preferences

Perception of cost-price:

Participants' perceptions of ISG system prices varied. Some found them expensive due to the "smart" technology, while others judged cost by material: plastic was seen as cheap, wood mid-range, and metal expensive. Seed pods were expected to cost between 1-2.50 euros, similar to supermarket plants.

Willingness to invest and perceived risk:

Most participants were not familiar with ISG and categorized it as an experimental product, making them more hesitant to adopt it without being certain about the product's compatibility with their needs. They preferred testing products at lower costs due to the perceived risk. Lease options were more appealing for expensive systems, offering a trial without upfront investment.

6.3.4 Target group and other interview insights

A set of more general insights has been collected throughout the interviews, including the following.

Purpose and plant preference:

The primary purpose for participants to consider a ISG system was the have year-round access to fresh greenery. Most participants preferred growing herbs due to its size, quick growth, and practical use in cooking.

User expectations and experience:

ease of use and low maintenance are important, but users also desire a sense of accomplishment, recognition, and ownership over plant growth.

"I think it can give you a very satisfied feeling, and it is probably fun and soothing"

More advanced gardeners are concerned that smart features may limit their involvement in the growing process stating

"If I would want to grow greenery, I want to do it myself".

Environmental Perspectives:

Environmentally conscious participants seek health benefits, self-sufficiency, and greater awareness of food sourcing. Less environmentally conscious participants view the system as a step toward increased eco-consciousness.

Placement preferences:

Participants generally envision the ISG in the kitchen, on windowsills, or on trolleys to integrate it with cooking activities. Some also see the potential for placement in living spaces to enjoy plant growth and experience a fulfilling feeling.

"Because it is fun to see things grow, the only thing is that i am not good at it"

Smart perceptions:

The term "indoor smart garden" creates varied expectations among consumers. Many imagined an enclosed greenhouse decked out with technology and sensors. Others thought of a smart device that can be integrated with existing plants throughout the home. The current product category name does not align well with consumer perceptions.

Interest in the ISG is mixed, with enthusiasm from some participants and hesitation from others due to cost or lack of interest.

6.3.5. Adoption perceptions between known vs. unknown PSS

Trialability and compatibility concerns

When it comes to novel PSS, consumers prefer testing the product's compatibility before committing. They are more interested in leasing such products without restrictions like subscriptions or memberships. Trialability, along with reviews from friends and online sources, plays a crucial role in their decision-making. Despite interest in leasing, buying is still preferred for the security of ownership. Leasing often raises concerns about hidden costs, quality, and lack of control, similar to subscriptions. Consumers are reluctant to invest in high-priced, unproven PSS. Lower-priced products increase the likelihood of trying out a product. The key is to offer freedom and flexibility, making the product more appealing and easier to adopt.

Brand familiarity

Often, well-known brand names are often misperceived with good quality and service. Consumers tend to choose familiarity to feel a sense of belonging and for the sake of comfort. When brand familiarity does not come into play (because of product novelty), consumers primarily judge the product based on its attributes to see if it is compatible. For the target group, aesthetics is considered the most important attribute when assessing compatibility.

Added benefits

Benefits that simplify consumers' lives, such as free repair and maintenance services, discounts, and complimentary products, are highly valued in services. But more niche benefits, such as access to limited products, extra information, learning tools, and community platforms, are less desired with traditional and known PSS. However, for novel PSS like the ISG, these niche benefits are very preferred because they offer new users extra support and assistance, which help uncover latent needs and increase the compatibility of the product, ultimately leading to a longer product lifespan.

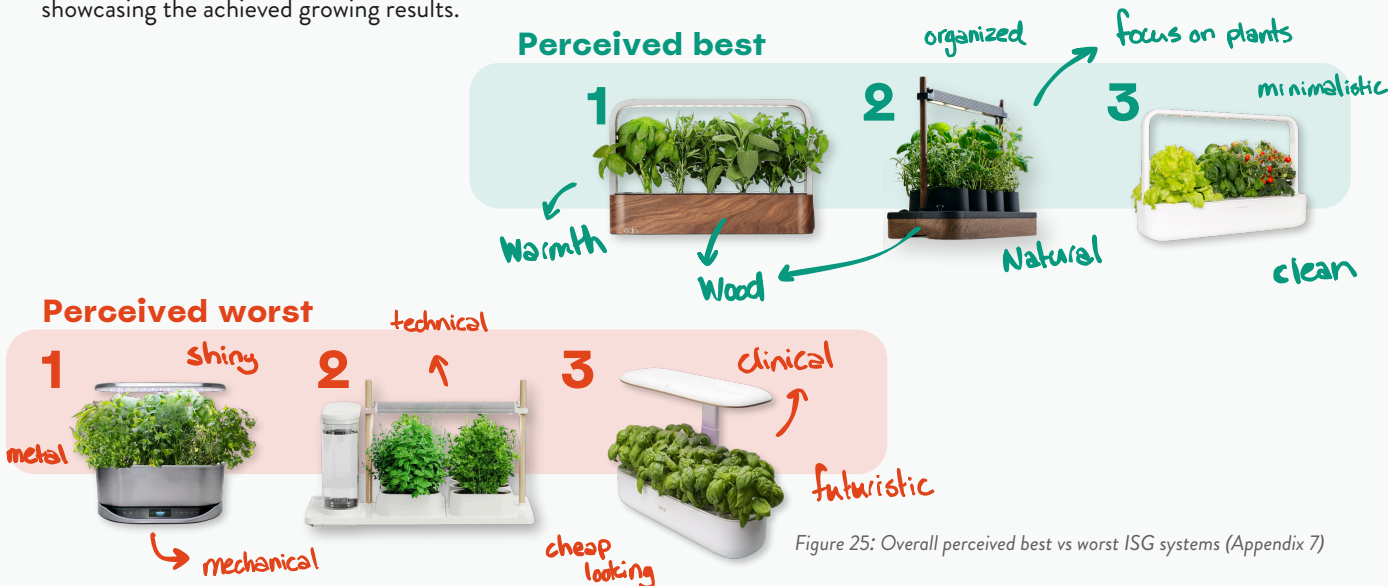


Figure 25: Overall perceived best vs worst ISG systems (Appendix 7)

6.4 Coding results

This section presents the results of the empirical study, with a specific focus on the tested conceptual model developed from the literature in Chapter 3 to uncover the adoption factors and barriers associated with ISG PSSs. The transcripts of the interviews were coded using Atlas.Ti, which allowed for a clear visualization of the results.

During the coding process, a new barrier to adoption was identified: **freedom and flexibility**. This barrier emerged from participants expressing concerns about the restrictions associated with subscription models, which was a recurring theme in the interviews.

Participant 5: “I don’t like being tied to a subscription with these pods because who knows, maybe this company doesn’t survive and than this system is not compatible anymore. And subscriptions make me itch anyway”

Participant 2: “And I usually notice that I don’t want to be tied to anything, that makes me feel oppressed.”

Participant 10: “It drives me crazy that you need subscriptions for everything these days.”

Figure 26 presents each identified factor and barrier, highlighting the ones that were mentioned most frequently and therefore considered the most significant in the ISG adoption process by new/future consumers. The adoption factors - lack of trust, personal norms, product attributes, and service attributes - were further divided into sub-factors to better illustrate the specific reasons consumers had in relation to the overarching barrier.

Analysing the data is challenging due to the interconnected nature of many barriers and the interpretation of quotations. While the results provide a good indication of the relative importance of each barrier, they should not be interpreted strictly.

Although most of the findings have already been covered in the earlier section on results, the most frequently mentioned adoption barriers specific to an ISG system are highlighted below to emphasize their significance:

Product attributes are the most significant barrier, with aesthetics and customizability being the most frequently mentioned sub-barriers. Consumers prioritize the appearance of the product and the ability to customize it according to their preferences.

Participant 11: “Because I think people have to deal with different interiors in their homes. I would like it if you could customize based on a number of fixed models.”

Lack of trust was a commonly cited barrier, with consumers expressing distrust in the product's performance or their own ability to maintain it. This resulted in a new sub barrier within this factor (trust in self), which was not a predefined factor/barrier derived from the literature.

Participant 4: “From my own experience i can tell that these kind of products really interest me at first and seem fun. But when it needs more time to maintain than I anticipated I know that it will end up in the closet at some point.”

Service attributes: Many participants emphasized the need for additional assistance and support in using the product, especially in nurturing the plants and maximizing their utility. This includes receiving supplementary information, tips, and suggestions.

Participant 6: “If such an app still provides feedback about what you are or doing right or wrong in such a system, because I am still afraid that I can ruin it by putting it in the sun or cutting my herb too short. Feedback would help then.”

Participant 10: “I would like to have some background information for fun. And if you are growing your own vegetables or herbs, you might also learn some more facts about them. Or be able to use an app for learning and entertainment.”

Emotional benefit and personal norm: Adoption rates increased when consumers perceived an emotional benefit or alignment with their personal values that significantly enhanced their quality of life.

Participant 11: “I would really like for it to teach my children the process of growing plants and how nature works, this can be very fun and educational for young children.”

Participant 6: “I enjoy taking care of things and I like talking about it. It would give me a great feeling of achieving something although the system does most of the work. Still, I have the feeling that I feel good about myself because I bought it, so that it works is also because of me.”

Participant 10: “Its nice to know where my food comes from and not having to worry about pesticides”

Ease of use: The more seamlessly the product could be integrated into daily life while adding value, the more positively participants responded to adopting it. Not only during use but also the ease in maintenance of the product was mentioned here.

Participant 2: “when I would come home from a long day at work I do not want to pick up an instruction booklet to figure out how much water my plants needs, but rather see that it has grown in the time I was not home.”

Price: Participants expressed concerns that the “smartness” of the product led to a higher product price, along with additional worries about increased energy costs. However, there was less concern about recurring expenses, such as the cost for seed pods. Overall, the higher the perceived cost, the lower the interest in the product, which aligns with expectations.

Participant 4: “Well the price is going to big deal breaker for me if it is very expensive. Also the energy costs that come in play might be an issue. I can also imagine that those UV lamps consume quite a lot of electricity.”

Participant 2: “It has a watering system and everything is automated. I think that that makes it a very pricy system.”

The results showed that the other factors: complexity, familiarity, lack of understanding, perceived risk, social influence, trialability, and perceived usefulness, which have been mentioned less in the interviews, still play a role in influencing consumer decision-making when it comes to adopting ISGs. However, these factors are not as dominant in the decision-making process as the ones described above. Although still having impact on adoption in this context, it is important to focus on addressing the most significant barriers in order to increase adoption.

Figure TBD shows a the end results in a graph and highlights more specific insights connected to particular factors. A more detailed image, including quotations from the interview transcripts can be found in Appendix 8.

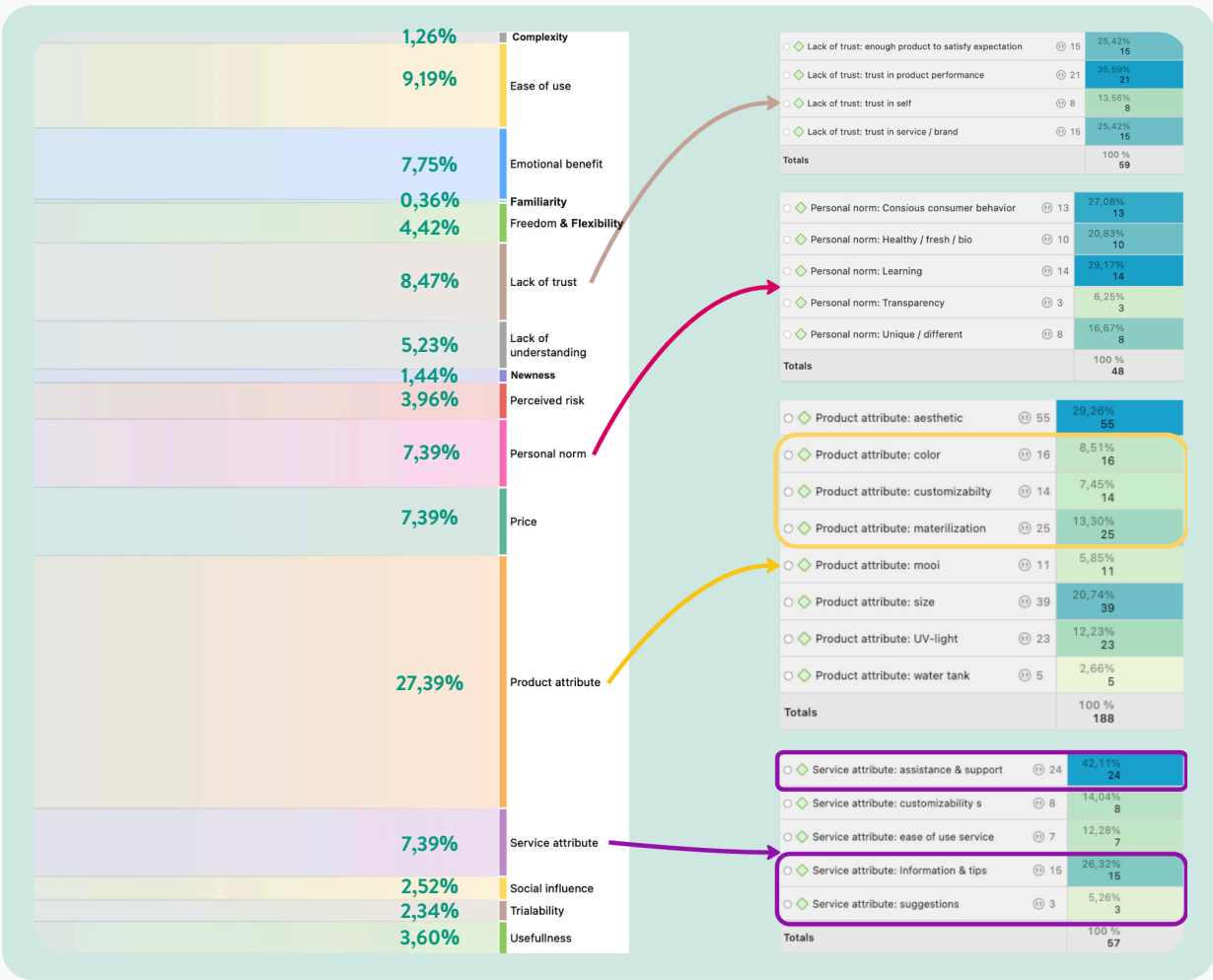


Figure 26: Coding results

07

DESIGN FOCUS

SCOPING & DESIGNING



This chapter serves as the intersection between the define and development phase within the double diamond method. It presents the overall conclusions drawn from the empirical research and provides direction for the next step in this thesis project. Advises based on the empirical research will be presented, along with a new design direction that includes a future vision and strategic direction for elho.

CONTENT

- 7.1 Overall conclusion empirical research
- 7.2 Potential (Advised) design directions
- 7.3 Perceptual maps
- 7.4 Future vision statement + strategic direction
- 7.5 Key takeaways and design drivers
 - 7.5.1 Key takeaways
 - 7.5.2 Design drivers



7.1. Overall conclusion empirical research

From the empirical research a multifaceted understanding has been obtained by synthesizing the insights from current ISG users through online reviews, insights from a designer's perspective and insights from the future target group of ISG. Combining these insights with a company understanding and thorough industry analysis this thesis has gained all insights to assess the proposed implementation of an ISG as a step towards servitization based on the projects' goal to create a desirable, feasible and viable model (see Figure 27).

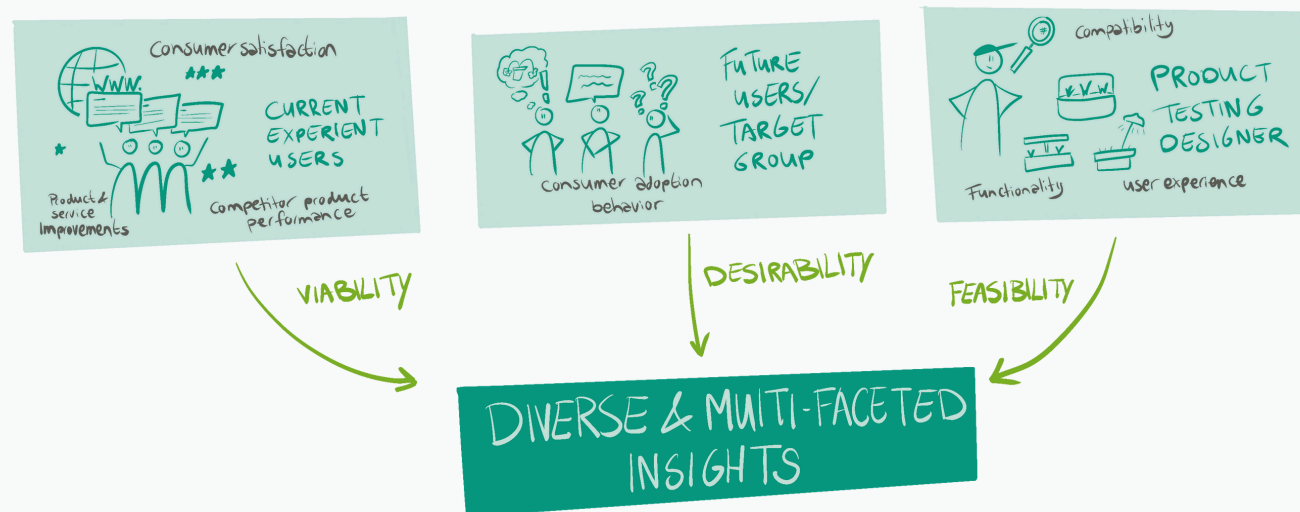


Figure 27: Visual empirical research approach

The empirical research findings provided below offer a comprehensive assessment of the risks and potential benefits associated with the introduction of the elho ISG.

It is an all-in-or-nothing PSS

To successfully launch the 'elho' alternative of an ISG PSS, full commitment is essential. This is an all-in-or-nothing PSS and elho's offering needs to contribute in new and /or innovative ways to the industry with at least the same level of offerings (product and service wise) as the competitors to ensure relevance for the industry and become appealing for consumers. This model is not easily approachable or accessible for a product-driven company and is not suitable for tentative exploration as a minor venture ('een voetje in het water steken'). Within the elho product portfolio, this PSS requires distinct recognition, potentially through the creation of a new product category or even establishing its own venture or brand. This approach is crucial for capturing attention and demonstrating the seriousness of this business model, especially when the strategy would be to directly target consumers (shifting from B2B to B2C).

Unlocking latent needs

The current ISG systems do not necessarily address a specific problem or latent needs and may be considered relatively non-essential products. Consumer interest and adoption are primarily driven by a hobbyist interest in easy self-growing. For new consumers, the decision to adopt is largely influenced by the product's uniqueness and compatible design, which enhances kitchen aesthetics and serves as a conversation piece. In addition, potential adopters seek an easy-to-use experience that provides a sense of accomplishment and discovery, as well as emotional benefits. However, current systems often fail to deliver useful and satisfactory results.

Furthermore, it is essential to pair the PSS with a compelling and effective branding and marketing strategy to create awareness and stimulate latent needs among the future target group. The competitor analysis (Figure 18) reveals that most brands adopt a similar, uninspiring approach to branding and marketing, which fails to effectively engage the intended consumers. To stand out, elho should invest in a strategy that differentiates itself

from these generic competitors and creates a strong connection with its audience. A distinct and compelling branding and marketing strategy should be developed to capture the attention of the target audience, which helps in enhancing elho's market position.

The challenge of service differentiation in ISG

Differentiating a PSS solely through service can be challenging, particularly in the competitive landscape of ISG.

- **Compatibility constraints:** To ensure optimal product functionality and avoid compatibility issues, offerings within this industry often share similar service features. Systems that use compatible seed pods can ensure better growth success and end-results by reducing the potential room for errors from the consumer's own input. The commonality with these seed pod offerings limits opportunities for significant service-based differentiation, especially when the functionalities and overall user goal of the physical product stay consistent to competitors. Therefore, focusing on emotional benefits and adding more distinctive service attributes is essential to create a unique selling proposition (USP).
- **The price of extra benefits:** While some consumers value additional benefits to optimize the use of their product, they are often reluctant when additional costs come into play. Especially when the price of the product already exceeds what they are willing to pay or when this results in recurring expenses, such as monthly subscription costs.

As such, this creates a balancing act when designing potential service features, requiring careful consideration to enhance perceived value without significantly increasing costs.

Design and price for product differentiation

We can achieve the greatest advantage and distinctiveness through our design and pricing strategy. Most systems on the market, including those tested by the author of this thesis, have demonstrated effective performance and generally deliver as promised. By reimagining the concept of an ISG, elho can create a product that stands out visually and functionally. Consumers seek an interior-compatible product that is customizable and preferably modular, which will contribute to the value of the product. Offering the product at a price point that matches the perception of consumers will encourage trialability creating a lock-in and without diminishing brand value would be another point of differentiation.

Finding the sweet spot between unobtrusive freedom and support

Consumer needs toward ISG services are clear: a service that offers flexibility and a sense of freedom, in combination with accessible assistance and support. Memberships and subscriptions are ways to give consumers enough incentive to keep using this product for a longer period of time and

prevent it from becoming a 'try-out' product that will not be used in the long run. However, the results of the analysis show consumer resistance towards subscriptions and monthly payments which creates a challenge. Competitors like Click and Grow, Edn, and InGarden offer a variety of subscription/membership options, but their business model may struggle without them. It is difficult to keep consumers motivated through subscriptions because interest fades when the novelty wears off over time and the element of surprise cannot be maintained causing consumers to churn out of these services (Eyal, 2022). Based on these conclusions, a set of potential design directions has been formulated and discussed in collaboration with elho to determine the project's next steps.

7.2 Potential (advised) design directions

Based on these overall conclusions, three possible directions have been formulated as advice for the client.

Direction 1: shift focus

This direction suggests that entering the current Indoor Smart Garden (ISG) industry may be too risky and require significant investment for elho Group. The ISG industry has not demonstrated long-term success among consumers, with low success rates among competitors. Additionally, the ISG concept does not align well with elho Group's existing business model or the level of servitization required by this concept.

Instead, it is advisable for elho Group to explore other horizon 2 and 3 opportunities within the PSS sector, where servitization can be achieved through a more feasible and viable business model. Focusing on areas with higher consumer acceptance and alignment with the company's capabilities and market strategy will likely yield better results.

Direction 2: embrace the challenge

This direction proposes that elho Group take the risk of entering the ISG market by refining the entire business model based on comprehensive research findings. The goal would be to create the most feasible, viable, and desirable ISG offering in the industry by optimizing and refining all elements of the current ISG business models to effectively compete with the leading competitors. This approach would prioritize replicating the most successful business model functionalities from competitors, aiming to deliver the optimal offering to consumers in theory.

Direction 3: Reimagine the ISG concept

This design direction focuses on fundamentally redesigning the ISG concept to develop a business model that is both feasible and desirable for the company and its consumers. By leveraging insights from research, this approach aims to reimagine the ISG concept in a way that better meets the needs of all stakeholders, resulting in a more holistic and sustainable plan. This strategy would involve rethinking the core aspects of the ISG concept to align more closely with market demands and elho's strengths.

In consultation with the client, the third design direction was chosen to explore new potential within the ISG industry.

As elho continues to show interest in the indoor segment and aims to add value to this industry, it is advisable to pursue this direction by leveraging elho's strengths into redesign the ISG concept. Shifting focus (Direction 1) would take the project too far outside its intended scope, and embracing the risk (Direction 2) by imitating and improving the competitors' model presents a significant possibility of limited success.

By choosing to reimagine the ISG concept, elho can develop a product that better aligns with consumer needs, prioritising customizability, ease of use, and aesthetics. This

approach also enables elho to utilise its internal expertise and innovation capabilities, resulting in a product that reflects the company's strengths in design and sustainability. Furthermore, this direction presents the opportunity to create a model that is easier to adopt for a company that is new to service offerings and therefore create a more approachable and scalable business model for this reimagined ISG concept.

7.3 Perceptual maps

When exploring the potential of a PSS concept, it is strategically advised to optimize not only the product itself, but also the accompanying service. This will ensure the creation of a coherent system. To allocate gap(s) in the ISG market a perceptual/positioning map (van Boeijen et al., 2013) is used, this is a visual tool that helps position a brand or product relative to its competitors in the minds of consumers. It helps to understand how customers perceive the range of market offerings. Because this concept deals with both a product and a service, two maps have been created.

The first perceptual map (Figure 28A) illustrates the strategic positioning of the physical product in relation to competitors in the ISG industry. The products are placed on a graph with two axes: the horizontal axis represents interior compatibility, which ranges from low to high based on factors like modularity, customizability, and consumer feedback on overall aesthetics. The vertical axis represents the price range of the products. Since consumers prioritize product attributes, elho should focus

on redesigning their product to improve its compatibility with consumers' personal interiors. However, the preferred price point was also assessed during empirical research. Therefore, the challenge lies in creating a product that is aesthetically compatible, affordable, and overall, more cost-effective than competitors' offerings.

The second perceptual map (Figure 28B) assesses how elho's product service system compares to competitors' offerings, specifically in terms of consumer experience. The horizontal axis focuses on the level of lifestyle integration and the communication of the PSS benefits. Meanwhile, the vertical axis represents the degree of interaction between the consumer, the product, and the service offerings. These placements are determined by insights gained from analysing the competitive landscape. In this map, elho's goal should be to position itself in the top right quadrant, indicating an enhancement in both the level of interaction and the integration of the system into consumers' lives.

Perceptual map for the product

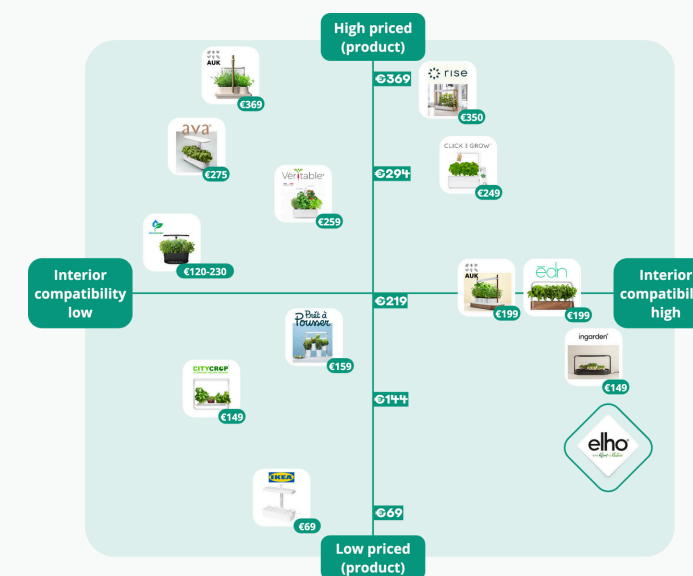


Figure 28A: Perceptual map product positioning

Perceptual map for the PSS

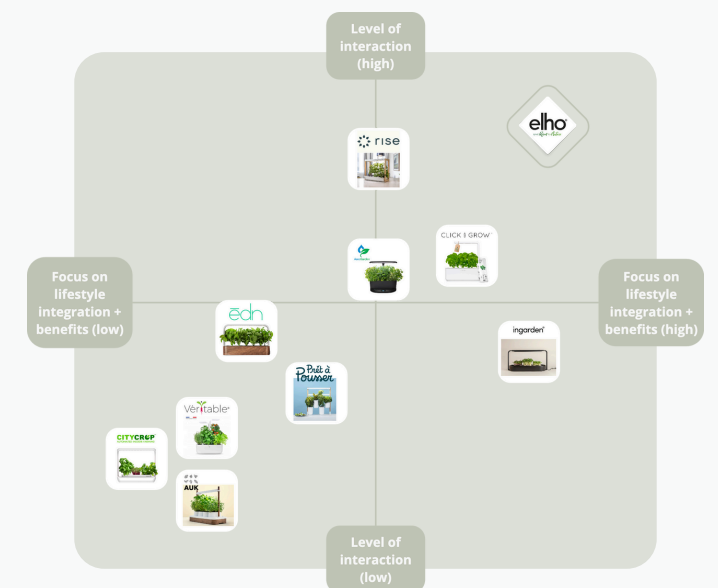


Figure 28B: Perceptual map PSS positioning

7.4 Future vision statement + strategic direction

The perceptual maps have provided insights into how elho's product can be strategically positioned within the ISG market. These maps highlight gaps in interior compatibility, pricing, lifestyle integration, and consumer interaction. However, to fully capitalize on these insights and ensure that elho's offerings not only address these gaps but also thrive in a competitive landscape, it is essential to establish a forward-looking strategic direction.

While the perceptual maps identified opportunities for improvement, they also revealed that current market offerings fail to fully engage users or seamlessly integrate into their lifestyles. This often leaves consumers uncertain about how to maximize the growing results of these systems and incorporate them meaningfully into their everyday lives. To address this, a comprehensive future vision has been developed. This vision will not only provide a roadmap for enhancing the user experience but also ensures that Elho's potential first PSS concept aligns with broader strategic objectives. By outlining this vision, the project gains a coherent strategy that guides the development of service offerings, fostering innovation while ensuring that each step forward is purposeful and aligned with long-term goals (Simonse, 2017). They ensure that elho's concept is not just a standalone product, but a well-integrated part of a holistic ecosystem that resonates with consumers and supports elho's growth in new markets. The designed future vision statement is:

Future vision
**"Your trusted partner in plant care:
 Supporting consumers in their
 journey to a green lifestyle with
 innovative, sustainable products and
 services that nurture both the user
 and their plants."**

Strategic direction

The proposed future vision statements for elho underscore the strategic direction of incorporating more service-oriented products into their portfolio with an emphasis of plant care. This shift is essential for several reasons:

- **Consumer relevance, engagement, and satisfaction:** By evolving into a 'partner in plant care' through service offerings, elho can provide continuous value to consumers beyond the initial purchase. This ongoing relationship could strengthen customer loyalty but also possibly enhance customer satisfaction. Engaging with customers throughout their plant care journey positions elho as a trusted advisor in green living rather than merely a product supplier. Satisfied customers are more likely to repurchase, recommend the brand to others, and participate in upselling opportunities, ultimately driving long-term business growth.
- **Meeting modern consumer expectations:** Today's consumers expect experiences and solutions that integrate seamlessly into their lives. elho can meet these expectations by offering services such as personalized plant care guidance and educational resources, making its offerings more attractive and relevant to the modern consumer.
- **Strategic shift towards B2C expansion:** With recent moves into online direct-to-consumer sales and the launch of a new digital product, elho is in a favourable position to integrate additional services, aligning with its strategic shift towards expanding its B2C footprint.
- **Sustainable living:** The vision emphasizes sustainability, a core value for both the target audience and elho. By promoting practices like local sourcing of plants, reducing waste through prolonged plant life, and offering sustainable plant care solutions, elho can appeal to eco-conscious customers and reinforce its commitment to environmental responsibility.

By adopting a future vision focused on plant care, elho can create a deeper connection with consumers, foster their sustainable practices, and obtain a competitive advantage in the market. This holistic approach ensures that elho remains at the forefront of innovation in plant care, continuously adding value and enriching the lives of its customers.

7.5 Key takeaways and design drivers

This chapter clarifies that this project is continuing with the overall philosophy of the ISG concept. However, by reevaluating and redesigning the critical points, the aim is to introduce an innovative system through the chosen design direction that competes effectively within the current ISG market but potentially creates overlaps with other markets or industries. This approach is intended to increase consumer adoption and enhance the desirability, viability, and feasibility of the concept, ultimately offering the perfect positioning for the growth and development of elho group, relevant to all stakeholders.

7.5.1 Key takeaways

The empirical research highlights that elho's entry into the ISG market demands a fully committed approach, emphasizing the need for distinct product and service innovation to stand out in a competitive landscape. To succeed, elho must create a well-designed, modular, and visually appealing product that meets consumers' demands for ease of use, emotional satisfaction, and affordability. However, differentiating through service offerings is challenging due to industry-wide compatibility constraints. Therefore, elho should strategically focus on providing unique value propositions that meet consumers' needs for flexibility and support, while avoiding high recurring costs.

The gaps found in the perceptual maps suggest that elho should focus its offerings to excel in both interior compatibility and consumer experience, ensuring that the product is not only visually appealing and affordable but also deeply integrated into users' lifestyles with high interaction and clear communication of benefits.

Elho's future vision centres on becoming a trusted partner in plant care by integrating supporting services next to its products. This strategy not only enhances consumer engagement and satisfaction but also positions elho to meet modern consumer expectations, expand its direct-to-consumer footprint, and lead in sustainable living, ultimately securing a competitive edge in the market.

7.5.2 Design drivers

7.1 A future-focused PSS for sustainable living

The concept should prioritize creating a PSS that improves the consumer's lifestyle. This can be achieved by leveraging the benefits to enhance the level of interaction between the user, the product, and the system. Additionally, the service should be developed with the future vision of becoming a trusted partner in plant care aiming to support consumers in their journey towards a greener lifestyle.

08

FROM VISION TO CONCEPT

SCOPING AND DESIGNING



This chapter elaborates on the process of conceptualizing a solution that aligns with the insights and design drivers that have been identified during the research. Starting with tackling the uncovered pain points, a further deep dive into the Dutch herb market and service industry to establish a well-defined design goal that serves as a guide in the development process. Collaborative co-creation sessions and one-on-one brainstorming sessions with peers and colleagues have led to the creation of a final concept.

Chapter objectives:

1. -The primary goal of this chapter is to achieve a clear and well-defined concept. This will be accomplished through an iterative design process that addresses the identified pain points and challenges. Additionally, the concept will be aligned with (new) market and industry insights, aiming to meet the established design goal for this PSS.

CONTENT

- 8.1 Overcoming the main challenges
- 8.2 Trend research and deep dive
 - 8.2.1 Subscription analysis Dutch market
 - 8.2.2 Trend research food and herbs industry
 - 8.2.3 The potential of the European herb market
- 8.3 Design goal, ideation and iteration process
 - 8.3.1 Design goal
 - 8.3.2 Persona's
 - 8.3.3 Co-creation session 1
 - 8.3.4 Brainstorm and detailing
 - 8.3.5 Co-creation session 2
- 8.4 Recap of the design phase



8.1 Overcoming the main challenges

Identifying the key challenges that influenced consumer perceptions and user experience were used for guiding the initial adjustments to the concept and reimagining its vision. In collaboration with A. Camps, a designer from the Innovation and Design team at elho, these challenges were analysed. This analysis resulted in a refined purpose and goal for the system, utilising the how-to method, which creates smaller problem statements framed as questions to support idea generation (van Boeijen et al., 2013). This process is visualized in Figure 29.

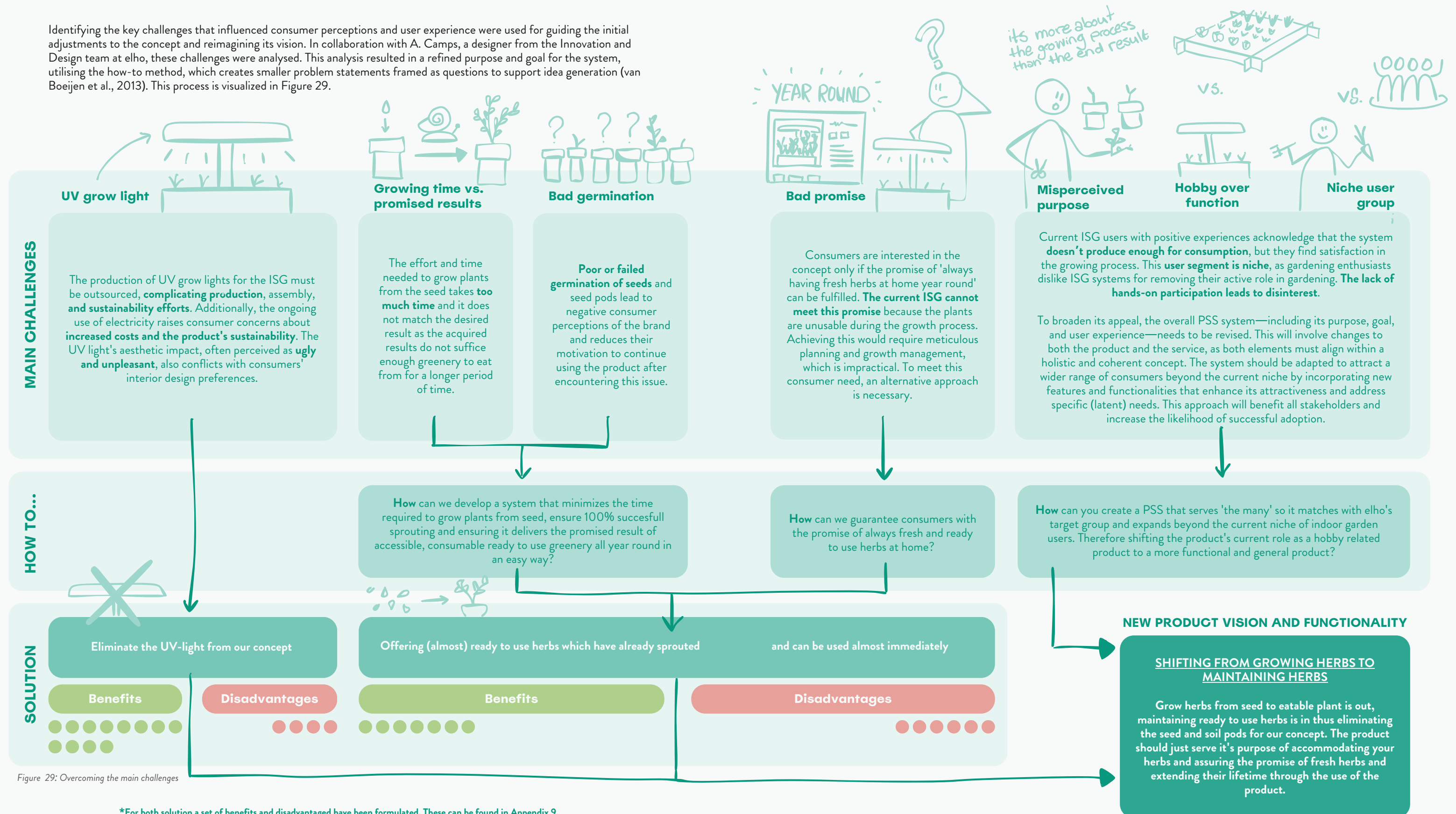


Figure 29: Overcoming the main challenges

*For both solution a set of benefits and disadvantages have been formulated. These can be found in Appendix 9.

8.2 Trend research and deep dive

To begin reimagining and further developing this shift in focus, it is necessary to acquire new knowledge. This will ensure that the final concept is able to address the appropriate functionalities, benefits, opportunities, and overall consumers' experience. As a result, a small consumer research study has been conducted on successful PSS brands in the Netherlands. This study aims to investigate what makes these brands favourable. Additionally, a trend research study has been conducted on food and herb trends. This research explores the herb industry and aims to gain knowledge of the benefits associated with growing herbs by households.

8.2.1 Subscription analysis Dutch market

Within this section an analysis of successful Dutch PPS brands has been conducted. It examines the most successful lifestyle PSS brands in the Netherlands. Lifestyle refers to brands that provide physical products through subscription models that can be integrated into or around households to enhance consumers' lifestyles. According to research by van Beek (2021) on product subscriptions in the Netherlands, the brands in the following eight categories are the most dominant in the field of product subscriptions: personal care and hygiene, ink and cartridges, flower delivery, lens delivery, meal kit delivery, coffee delivery, bicycle subscription services, and other. An assessment on the biggest brands in these categories has been conducted based on the type of PSS (product, use, or result-oriented) as well as an analysis of the common factors that make these brands desirable, feasible, and viable Figure 30 (can be found in more detail in Appendix 10).

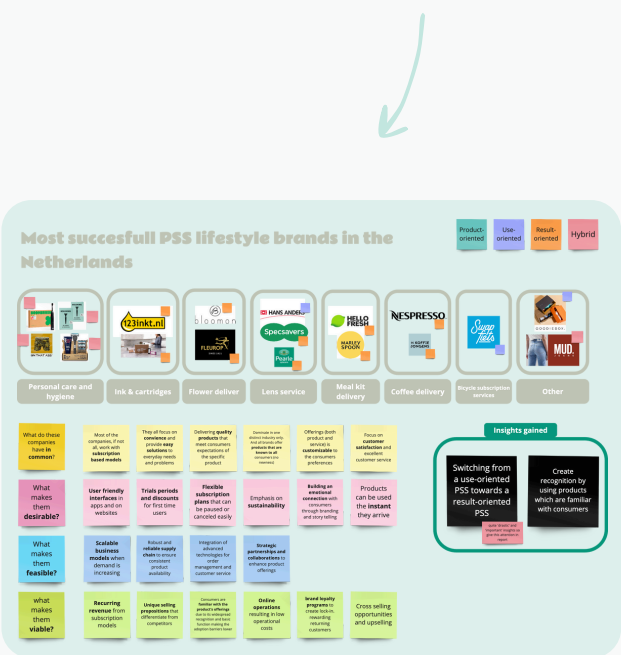


Figure 30: Analysis successful PSS lifestyle brands in the Netherlands (Appendix 10)

The research by van Beek (2021) on product-oriented subscription models reveals several key insights into consumer behaviour and market trends in the Netherlands. These findings are helpful for understanding the appeal and potential of such services.

Product subscriptions are extremely popular among younger consumers, particularly those **aged 18-34**. This trend is consistent across all income levels within this age category. **Approximately 15% of all Dutch consumers are subscribed to a physical product, with food and personal care products equally making up almost half of this market** (Figure 31). Interestingly, **food subscriptions are more common among 35-49-year-olds** who live with a partner but do not have children.

The primary motivation for subscribing to these services is convenience. Consumers want to avoid visiting stores (51%), simplify restocking (38%), and ensure a consistent supply (28%). Other factors that influence consumer decisions include quality (29%), pricing (23%), and the element of surprise (22%).

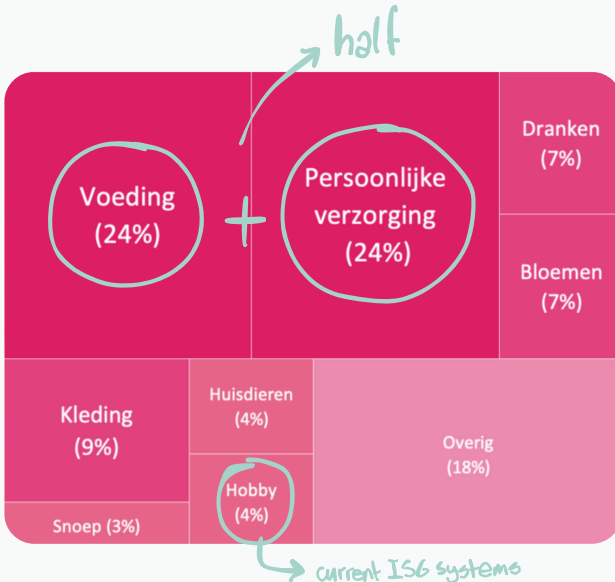


Figure 31: Dutch market distribution product subscriptions (Van Beek, 2021)

There is a significant level of interest in product subscriptions from local providers, with **34% of consumers expressing their willingness to consider subscriptions from local businesses**. Consumer satisfaction in this market is driven by reliable delivery, good service, and the ability to pause subscriptions when needed.

Applying these insights to this project, several key points emerge:

- A **result-oriented PSS** appears to be more **understandable and preferred** by consumers compared to a product-oriented PSS (which is the model used by current ISG systems) (Figure 32).
- **Familiarity** with products and their daily use tends to increase their popularity among consumers, likely due to prior experience with similar products.
- The current ISG systems are classified as **'hobby'** products, which account for **just 4%** of the Dutch product subscription market, making it the smallest segment. Creating an overlap with another category could increase traction.

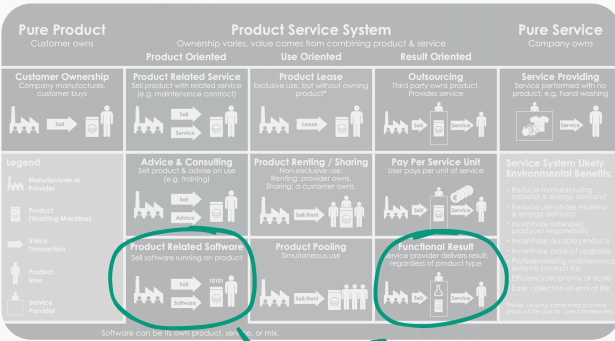


Figure 32: PSS shift (Tukker, 2004)

8.2.2 Trend research food and herbs industry

To gain a comprehensive understanding of the target market, a thorough analysis of both the herb and food industry was conducted. Employing desk research and strategic trend scanning (Simonse, 2017), key consumer trends in these industries were identified.

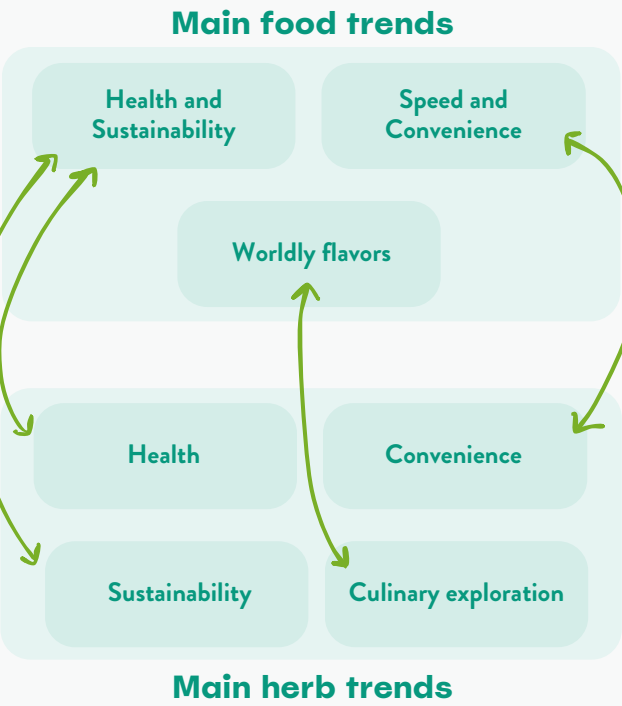


Figure 33: Comparative overview trend research

Figure 33 presents a comparative overview of the identified trends in both the food and the herb industry. Central themes emerging from this analysis include health, sustainability, and convenience, providing valuable insights into consumer needs and preferences. These insights serve as a foundation for effectively communicating the concept's benefits as well as the needed functionalities incorporated in the PSS. The trend research in more depth can be found in Appendix 11 (Figure 34).



Figure 34: Food and herb trend research (Appendix 11)

8.2.3 The potential of the European herb market

Also, a small-scale investigation into the European herb market was conducted to acquire additional knowledge on the latest developments and new insights in this industry.

Growing demand and market opportunities

The European herb market offers significant opportunities for growth due to increasing consumer interest in fresh, natural, and organic products (Merva, 2024). Key markets have seen a steady increase in import value, thanks to a reliable supply from non-European farmers. Although consumers prefer locally sourced produce, a considerable number of herbs is still imported from countries outside the European Union, making up about 5-10% of the market (The European Market Potential For Fresh Culinary Herbs | CBI, 2024). Europe imports fresh herbs worth over €77.5 million annually, highlighting the strong demand and potential for market expansion shown in Figure 35.

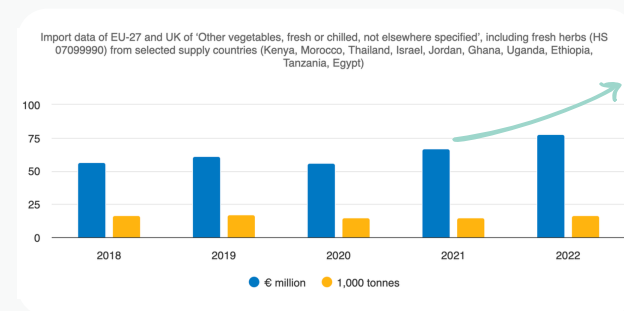


Figure 35: Indicative European import of fresh herbs (CBI, 2024)

Key herb varieties and consumer preferences

In the European market, popular herbs like basil, coriander, chives, mint, and parsley are widely consumed. However, there is also a demand for exotic varieties such as Thai basil, lemongrass, and curry leaves, mainly targeting niche segments (CBI, 2024). The Netherlands plays a significant role in the herb industry, acting as both an importer and exporter of fresh herbs due to its advantageous trade and logistics position. The consumption of herbs within the Netherlands is increasing (Heijboer, 2024), particularly during and after corona when consumers started cooking at home more often and with the integration of fresh herbs in supermarket meal boxes (Heemskerk, 2021). Additionally, the Indo-Asian influence has contributed to the rising demand for herbs like coriander and lemongrass. During the winter season, when local production is limited, the Netherlands imports herbs from countries such as Kenya and Israel to meet the demand (CBI, 2024).

Challenges in herb production and supply chain

Dried herbs lose flavor intensity, making fresh herbs preferable (Mill, 2020). Imported herbs are often immediately distributed to wholesale and food service segments or repacked into refrigerated packages for retail distribution, but the handling process of retaining fresh herbs throughout this process can be demanding. European growers face challenges in providing year-round high-quality fresh herbs, relying on greenhouses and imports (CBI, 2024). The quality and availability of herbs are significantly influenced by the climate, which leads importers to source from other regions. While, greenhouse production is often criticized for its sustainability concerns, open-field cultivation raises issues related to agricultural inputs and water use (CBI, 2024). This highlights the importance of supply chain efficiency and the selection of the best quality and sustainable products.

Vertical farming: A revolutionary solution

Vertical farming addresses traditional agricultural challenges like climate change. It offers reduced water usage, year-round production, and consistent quality in controlled environments (Lempert, 2023). Vertical farms grow herbs faster, yield multiple harvests, and ensure pesticide-free produce, making them suitable for urban agriculture (Van Naamen, 2023). However, challenges include high initial investments, energy consumption, limited crop variety, and a skill gap in adapting from traditional farming methods (Lempert, 2023).

Designing a PSS for the European herb market

Having gained this knowledge of the European herb market, any PSS designed for this sector must consider the diverse consumer preferences, the importance of freshness, and the challenges in maintaining a year-round supply. Incorporating vertical farming could provide a sustainable and efficient solution to meet the growing demand for fresh herbs. Additionally, leveraging technology and innovation will be critical in optimizing the production, herb variety, and supply chain, ensuring that consumers receive high-quality herbs that meet their culinary and lifestyle needs.

8.3 Design goal, ideation and iteration process

After gaining new knowledge on Dutch consumer preferences in product subscriptions, consumer trends, and knowledge in the food and herb industry, as well as overcoming initial challenges in the current ISG system, a focused design goal can be formulated. This goal will serve as the foundation for the iteration design phase.

8.3.1 Design goal

Conclusion + Perceptual maps + Future vision + Main challenges + Trends

Design goal

"Design a user-centric, result-oriented product-service system that offers year-round access to high-quality, diverse, locally grown herbs, providing convenience and support for consumers at any stage of their journey towards a green lifestyle."

*The word "green" can have a wider interpretation that encompasses concepts such as health, (personal) growth, sustainability, nature richness, plant-based etc.

Now that the design goal is formulated, the next phase in the process is the ideation and iteration phase. This part is a non-linear process in which designers continuously move back and forth between ideas and concepts, allowing for the continuous refinement and adaptation of new ideas. Included in this step are the following key exercises:

1. Creating persona's
2. Co-creation session 1: creative workshop with peers
3. Brainstorming and detailing
4. Co-creation session 2: Sketch and design session with designers

8.3.2 Persona's

A remark made by elho during the research was that the target group used in the empirical research was too specific for the client's liking, as this brand offers products for a wide range of consumers. While the initial target group remains a successful target audience for PSS adoption as they tend to be early adopters (Rogers, 2003), the final concept should be designed for consumers beyond this scope. Therefore, a set of personas was created and used as archetypical representations of intended users (van Boeijen et al., 2013). These personas served as a reference point throughout the ideation and iteration process and were used during the co-creation sessions.

Figure 36 shows an example of one of the three created persona's (Appendix 12). They are built up based on a profile picture, demographics, and a piece of text describing their background story, personality traits, hobbies, and lifestyle. Here is a concise summary:



Figure 36: Persona (Appendix 12)

Pieter: A 30-year-old project manager living in Amsterdam with his boyfriend Thomas. Pieter is health-conscious, enjoys working out, and has a passion for cooking, particularly Asian cuisine. He values healthy living, meal prepping, and integrating technology into his daily life. Pieter balances his busy work schedule with social activities, such as playing padel and hosting dinners for friends.

Caroline: A 56-year-old interim HR recruiter living alone in a charming house in Hoevelaken with her dog, Max. After her divorce, Caroline embraced new hobbies, such as pottery, yoga, and gardening, and values a spiritually fulfilling and environmentally conscious lifestyle. She enjoys social activities like playing tennis with friends but also treasures the peace and tranquillity of her home and garden.

Taco: A 41-year-old freelance photographer and devoted family man living in Rijswijk with his wife Loes and their three children. Taco balances his creative work with family life, enjoying cooking, baking, and DIY projects at home. He values quality time with his family, embraces a mostly vegetarian diet, and loves outdoor activities like mountain biking. He is practical and budget-conscious, often looking for deals and experimenting with meal kits.

Despite having diverse personalities, these three personas share a common goal: **living a sustainable lifestyle**. They all prioritize health, value social connection, and make conscious choices that align with their personal values while striving for adaptability and balance.

8.3.3 Co-creation session 1

Within the design phase, it was important to gather different viewpoints in order to gain new insights and perspectives to improve the concept. Therefore, a creative co-creation session was organized with five TU Delft students.

Unresolved challenges

In addition to the main challenges addressed at the beginning of this chapter, other identified challenges still need to be resolved. These unresolved challenges are outlined in below and reformulated using the 'how-to' technique (van Boeijen et al., 2013).

Low effort vs reward

The idea of growing your own plants is intriguing, but consumers are hesitant about maintaining the product long-term. Consumers expect plants to thrive perfectly in a controlled ISG environment. They want a product that's easy to use with minimal maintenance but still desire a sense of pride and ownership over the grown plants, as if they had done the hard work.

How to...

How can we instill a sense of pride and ownership in users, making them feel personally accomplished in the cultivation of their plants with minimal effort?

Subscription restrictions

The current ISG concept faces consumer distrust due to inflexible subscription services, which make consumers feel trapped and prevent them from adopting. Monthly payments are seen as unpleasant, and many are unwilling to commit to yet another subscription, feeling restricted by use-oriented PSS models. To address this, subscription models must offer low-effort trialability, flexibility, and a sense of control to build trust, align with consumer needs, and make monthly payments more acceptable.

How to...

How might we create opportunities for consumers to engage with and experience a product hands-on, despite an exclusive online sales model, to foster emotional connections and build trust, ultimately enhancing product acceptance, and satisfaction?



Online awareness challenges

The exclusive online sales model limits consumers' ability to develop an emotional connection with the product through hands-on experience and trialability, making it challenging for them to assess or review the product. This new product unfamiliarity plays a big role in accepting a system that still has to prove its compatibility. This lack of direct interaction can hinder consumer acceptance and trust, as physical engagement is a key factor in the adoption of new products and services.

How to...

How can we redesign the service business model to give consumers more freedom, flexibility, and control, removing the feelings of entrapment associated with PSS subscription models, and making monthly payments more appealing to build trust and encourage adoption?

Structure of the session

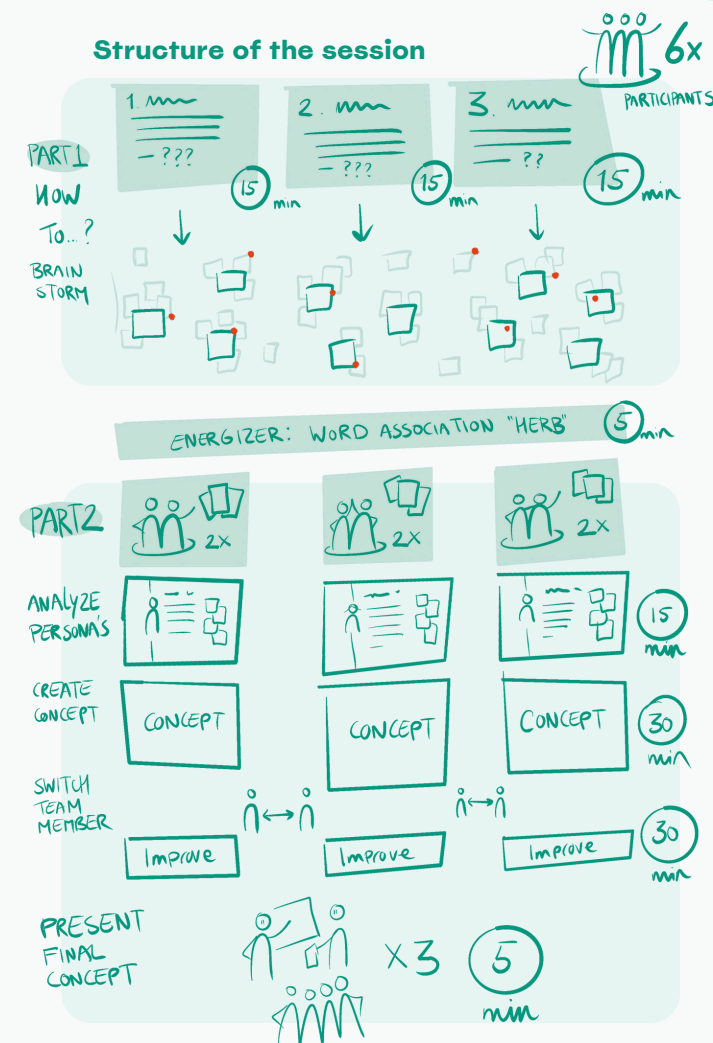


Figure 37: Structure of the session

FROM VISION TO CONCEPT

Goal of the Session

The primary objective of the session was to gather input on these challenges identified through the empirical research and to explore possible concept directions within the created design goal.

Session preparation

For the session, a set of work templates with instructions was created alongside a brown paper to lead the session with. The space where the session took place was transformed into a brainstorming-friendly environment with plenty of materials, plants, and snacks to inspire creativity. The session took place on the 10th of July, from 10:00 AM to 13:00 PM.

Structure of the session

The session consisted of two parts:

- Part One: Brainstorming unresolved challenges:** The first part of the session involved 15-minute brainstorming rounds focused on addressing the main challenges identified through empirical research show in Figure 37. The participants were encouraged to defer judgments, work visually and build on each other's ideas. The goal was to go for quantity, fostering a collaborative and open-minded atmosphere. In between these parts, a quick energizer was done involving a word association exercise with the word "herb." This input served as inspiration for the second part of the session.
- Part Two: Concept creation:** The second part of the session focused on creating concepts that aligned with the design goal. The group of 6 students was divided into pairs, and each pair was given a working template (Figure 38) that guided them step by step in developing a presentable concept. Each duo was assigned one of the three personas that had been created.

The process began with the participants immersing themselves in the persona, defining the persona's values, with which they could create a concept that resonated with those values. To ensure a fresh perspective, team members were swapped halfway the exercise. Finally, the three developed concepts were presented to the entire group for discussion and feedback.

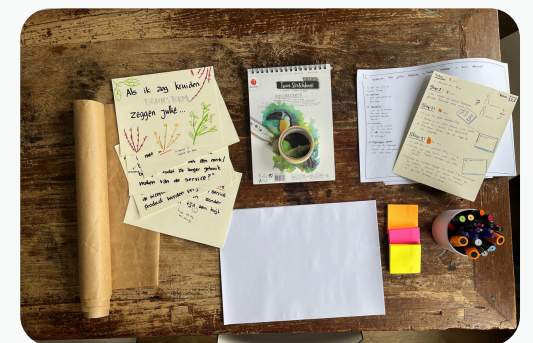


Figure 38: Materials and templates used in the session

Main insights

Shown in Figure 39 is the output from the brainstorming exercise that have been clustered after the session to form concrete solutions to the challenges. The ones highlighted in pink have been selected as they seemed interesting to continue with.

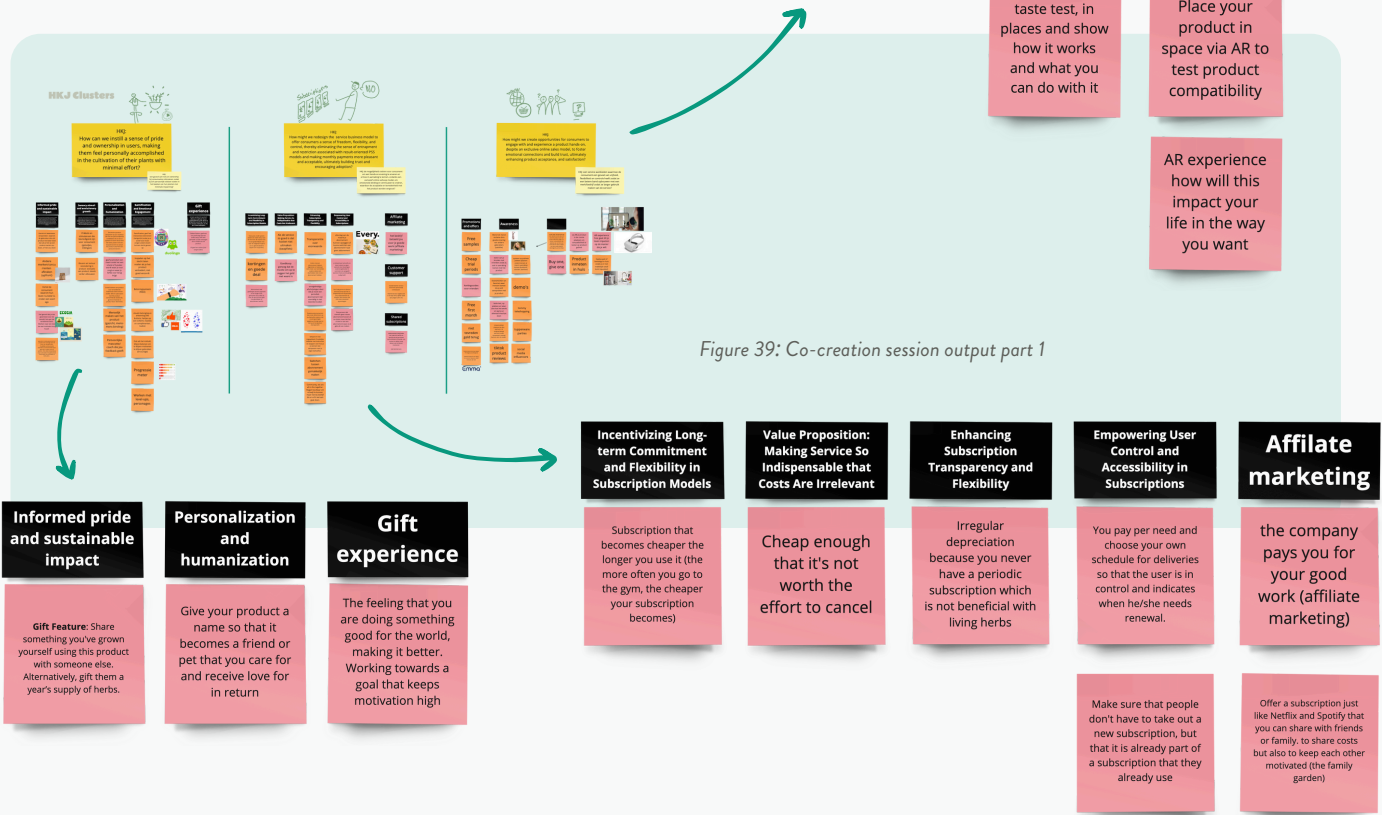


Figure 39: Co-creation session output part 1

The output from the concept creation part (part 2 of the co-creation session) have turned into more concrete concept ideas that have been used to form the foundation of the final concept shown in Figure 40. Images from the co-creation session are shown in Figure 41.

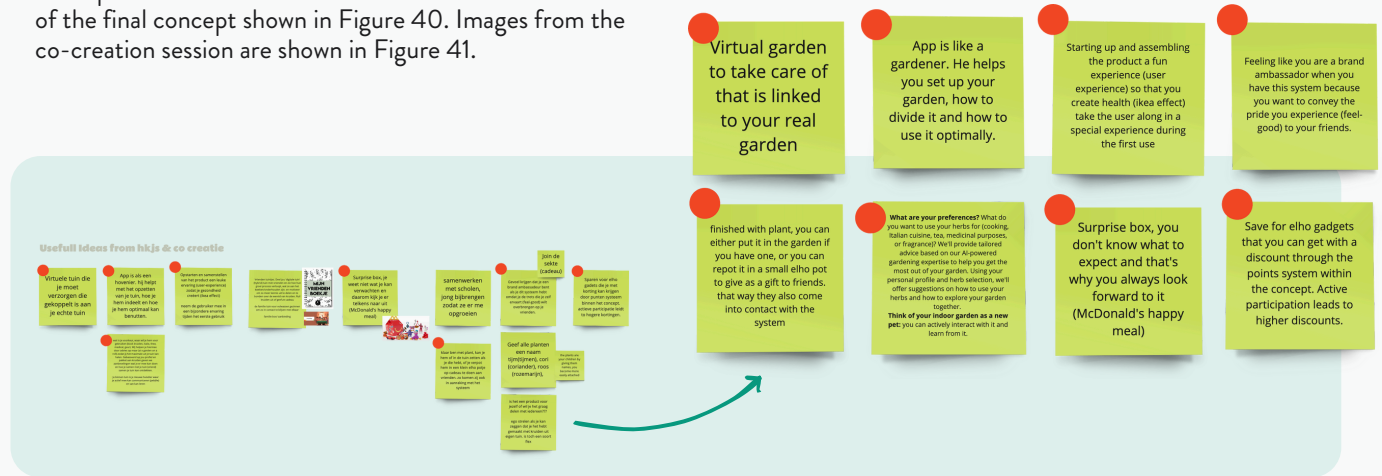


Figure 40: Co-creation session output part 2



Figure 41: Co-creation session 1

8.3.4 Brainstorm and detailing

During the development of the concept, several new challenges emerged, and gaps within the user experience, service and business model needed to be addressed to make this concept as desirable, feasible, and viable as possible for all stakeholders involved.

The main challenges that still needed to be resolved included:

- **Logistics and demand forecasting:** Developing a reliable system for managing the logistics of delivering living herbs from the supplier to the consumer, while being able to accurately forecast demand.
- **Creating a reward system:** Designing a value proposition that effectively motivates users to continue purchasing herbs without requiring them to commit to a subscription model.
- **Generating recurring revenue:** Establishing a sustainable revenue model that relies on selling consumables with an extended lifespan, which inherently reduces the frequency of purchases.
- **Offering a unique AI experience:** Developing an AI feature that provides a unique value beyond what is typically offered by existing AI chatbots, ensuring continuous engagement with the specific AI created for this PSS.

These challenges were discussed and iterated upon throughout the design phase. Spontaneous brainstorming sessions with peers helped to generate ideas to close these gaps which have led to the final concept for this thesis (Figure 42).

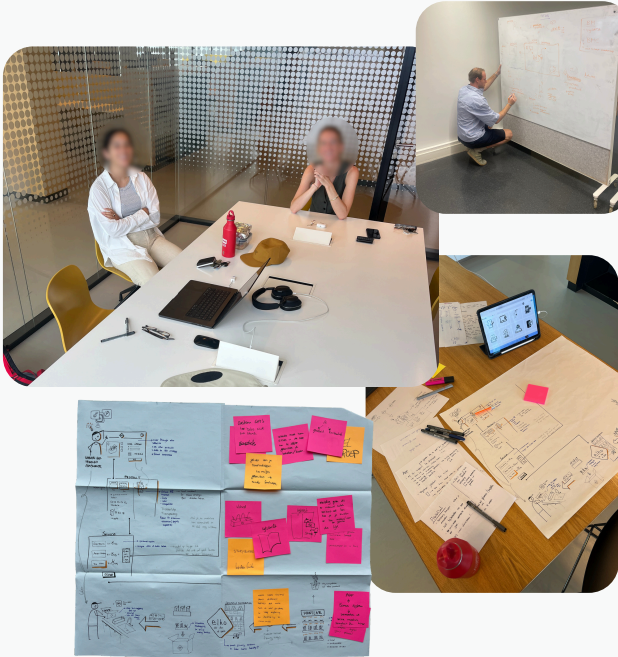


Figure 42: Brainstorming session

8.3.5 Co-creation session 2

At this point the foundation for the PSS has been created, a second co-creation session was conducted in collaboration with elho's in-house product designers. Through the research, many valuable insights were gained on the physical design of the products from consumer interviews, reviews, and testing. This led to the formulation of a detailed design brief that specifically focuses on the (re)design of the product to align with the created service concept which can be found in Appendix 13.

The co-creation session took place on August 29, 2024, with the head of design (M. Chrisander) and the lead designer (B. van der Veer) from the Innovation and Design team. The session began with a presentation I had prepared, which provided a brief explanation of the project context, the research conducted, and the design goal for the day. This was followed by a thorough explanation of the design brief created for the (re)design of the product.

Product design brief

The design brief included a project overview that outlined the overall goal of the project and identified the target audience, with the personas playing a key role. A brief analysis of the state-of-the-art ISG was shared, highlighting the general user pain points and positive attributes of the product derived from the research. The best and worst perceived product looks were also discussed, along with the necessary product changes to meet the current design goal. The main challenges identified throughout this chapter which were connected to the product design were also addressed.

The brief concluded a list of functional requirements and a list of preferences. These are the essential characteristics that the design must meet for success. It clearly outlines all the design objectives the product must meet (Cross, 1989) and any additional wishes that would further enhance the design's success. An overall look and feel was created through a collage which served as an inspirational visual.

The sessions

For the session, I brought sketch paper, fine liners, and markers for us to work with. We had roughly an hour to create a first iteration of the product, which could serve as a starting point for further development after this thesis.

I offered some initial sketches to demonstrate the main functions of the product (Figure 43). This allowed us to focus the aesthetics of the product and on creating a three-dimensional prototype. The objective was to visually communicate the functionality and overall vision of the product which enhances understandability of the entire PSS in the end. Together with interim designer J. van Dongen some slight adjustments were made to the design and a set of quick renderings were created. Figure 43 displays images from the co-creation session.

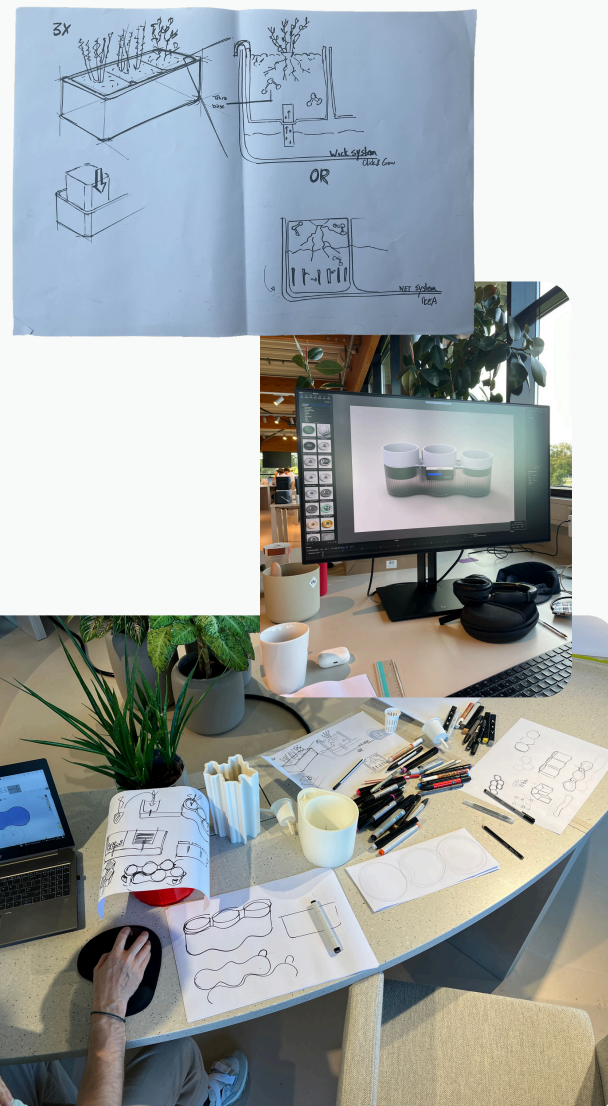


Figure 43: Co-creation session 2

8.4 Recap of the design phase

The objective of this chapter was to establish a clear and well-defined concept that builds upon the chosen design direction outlined in chapter 7. Through an iterative design process, which included several (design) activities this objective was met. Following below is a short recap of these activities, which ultimately led to the final concept designed for this thesis.

Overcoming the main challenges

- **Eliminating UV grow lights:** Outsourcing the production of UV grow lights would complicate production and sustainability incentives. Additionally, the ongoing electricity usage and the aesthetic drawbacks of UV light raised concerns by consumers. Therefore, the decision was made to eliminate UV lights from the concept.
- **Improving plant availability:** Growing herbs from seeds required significant time and effort and often resulted in poor or failed germination, leading to negative consumer experiences. To ensure consumers always have fresh herbs available, the concept shifted to providing (almost) ready-to-use herbs decreasing the time to use and being able to live up to a promise.
- **Broadening consumer appeal:** The current ISG system was primarily appealing to a niche market interested in the growing process, but not particularly in the yield. Consumers with an interest in gardening often found the current system unengaging. To address this, the product's purpose shifted from growing herbs to maintaining ready-to-use herbs, removing the need for seeds and soil pods. This aims to expand the appeal beyond niche consumers by focusing on convenience and usability.

Insights from subscription market analysis

An analysis of the Dutch PSS subscription market revealed that a result-oriented PSSs are more understandable and preferred by consumers compared to product-oriented PSSs. Familiarity with products tends to increase popularity, likely due to prior experience with similar products, posing herbs as more understandable than seed pods. The findings also indicated that the current ISG systems cater to the smallest PPS segment in the industry which is the 'hobby' segment, representing only 4% of the market. The concept was adjusted to reflect these insights.

Aligning with food and herb industry trends

Research into the herb and food industries identified overlapping key trends which included health, sustainability, speed, convenience, exploration, and diverse Flavors as most important. The European herb market has great potential for growth, thanks to the rising consumer demand for fresh and organic products (Merva, 2024). Although imports currently dominate the market, there is an opportunity for domestic production, particularly through vertical farming. However, there are some key challenges that need to be addressed, such as ensuring a consistent supply throughout the year and tackling sustainability concerns (CBI, 2024).

Design Goal

Based on these insights, the design goal was formulated:

"Design a user-centric, result-oriented product-service system that offers year-round access to high-quality, diverse, locally grown herbs, providing convenience and support for consumers at any stage of their journey towards a green lifestyle."

Ideation and Iteration Process

The concept was finalized through multiple ideation and iteration sessions, including co-creation and brainstorming with TU Delft students and with elho's Innovation and Design team. The final concept will be presented in the next chapter.

09

PRESENTING THE CONCEPT

PRESENTING CONCEPT



This chapter presents the final concept, illustrated through a customer journey map. It provides a comprehensive overview of the concept from the consumer's perspective, along with detailed visualizations and explanations of all the incorporated elements. The chapter concludes by highlighting the impact this concept has for the client.

CONTENT

- 9.1 Introducing the concept
 - 9.1.1 Concept description
 - 9.1.2 Positioning statement
- 9.2 Customer journey
- 9.3 Concept in detail
 - 9.3.1 App as a service
 - 9.3.2 Product design functionality
 - 9.3.3 Product design vision
 - 9.3.4 Branding and packaging of herbs
- 9.4 Impact of the proposed concept



9.1 Introducing the concept

The proposed concept represents an accessible PSS that can serve as a foundation for elho's expansion into a more service-oriented business model. Inspired by the foundational principles of existing ISG products researched throughout this thesis, this new iteration on the concept of indoor gardening focuses on enhancing functionality and convenience, while also aiming to provide a deeper personalized, and emotionally fulfilling experience.

9.1.1 Concept description

With Tuyn, consumers have the ability to maintain and grow an incredible variety of locally-grown, home-delivered herbs. By leveraging automated features and AI-driven guidance, Tuyn ensures that herb gardening is not only accessible but also deeply personalized. The AI's role extends beyond mere nurture assistance; but takes a step beyond the growing process by helping users incorporate these herbs into their lifestyle, aligning with the agreed consumers' individual goals and needs.

At the core of this concept is a focus on supporting and inspiring customers on their journey towards a greener lifestyle. This includes not only the growing and nurturing process but also the utilization of the herbs in everyday life. The experience is designed to be convenient and engaging, with a strong emphasis on personalization. The system adapts to each user's preferences, offering a tailored approach that helps them discover the full potential of their herb garden.

The product design, featuring customizable features and expansion options, goes beyond mere functionality and serves as an enhancement to any living space, adding a touch of design and beauty.

9.1.2 Positioning statement

At its core, this concept is driven by a vision to provide consumers with year-round access to high-quality, diverse, and locally-grown herbs, supporting consumers at every stage of their journey toward a green lifestyle. Fitting in with the developed strategic direction for elho to become a trusted partner in plant care.

By leveraging aesthetic and customizable design, modern AI technology, and elaborate consumer insights, 'Tuyn' came together. Therefore creating the following positioning statement:

From novelty gadget to lifestyle companion

Elho's Tuyn aspires to be a lifestyle essential for urban eco-minded consumers, merging aesthetic, customizable design with an engaging, supportive experience. Offering easy exploration and a sense of achievement, evolving indoor gardening from a mere novelty to a sustainable, trusted system that adds beauty to any living space.



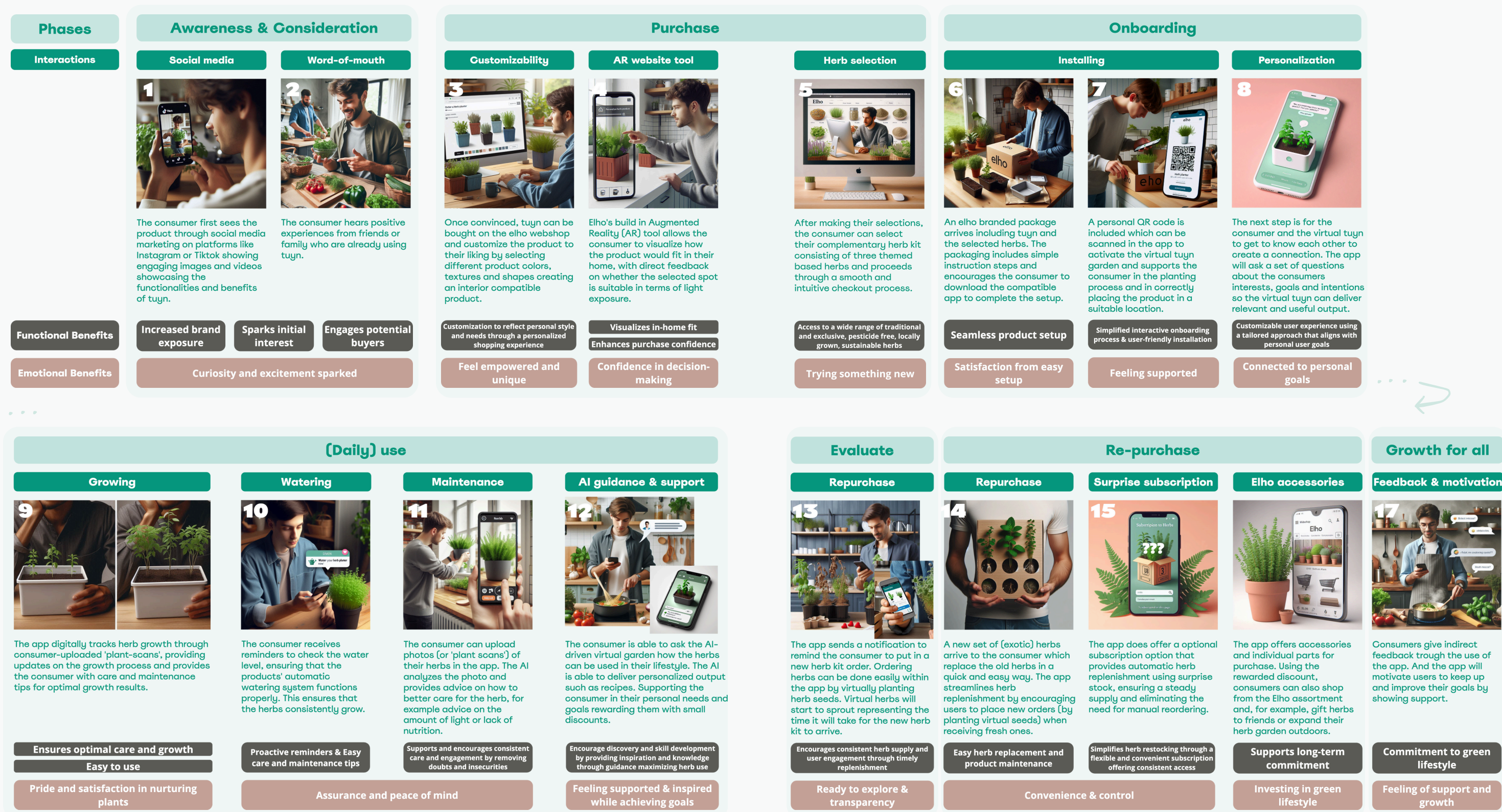
Tuyn empowers consumers to effortlessly maintain and grow a diverse range of home-delivered herbs, with the support of automated features and AI-driven guidance. The system is designed to adapt to individual preferences, making herb gardening not just simple but personally meaningful. Beyond cultivation support, it assists in seamlessly integrating herbs into everyday life, helping users achieve their green lifestyle goals. With its customizable design, Tuyn enhances any living space, offering both functionality and aesthetic appeal.



9.2 Customer journey

A customer journey represents the entire experience a consumer has with a product, service, or brand across various channels and touchpoints (Harris et al., 2020). In this thesis, the customer journey (Figure 44) is used to clearly communicate the PSS concept, offering a comprehensive view of consumer engagement, benefits, emotional connections, and overall experience.

Figure 44: Concept customer journey



9.3 Concept in detail

To further explore the concept, specific elements of the concept have been visualized more realistically. This is done to effectively convey the functionalities, design choices, and the overall intended appearance of the Tuyn PSS system, creating a more tangible and realistic concept.

9.3.1 App as a service

The first part of the concept is the application, which serves as the guide throughout this experience. It supports the user and enhances interaction between the product and the user. The User Interface is designed to showcase all the features included in the application, which are derived from research insights gathered in earlier stages of the project.

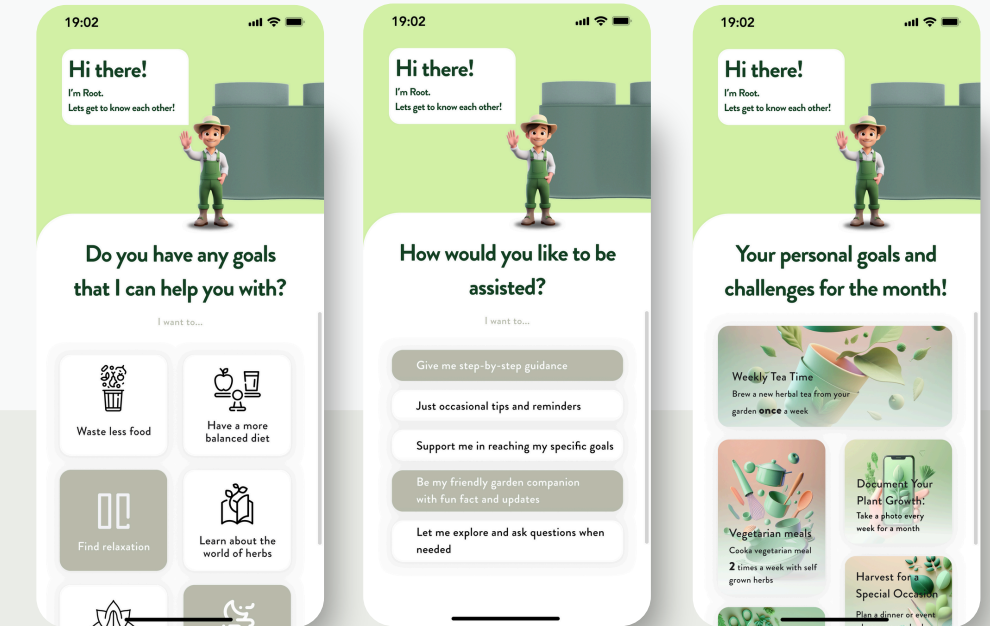
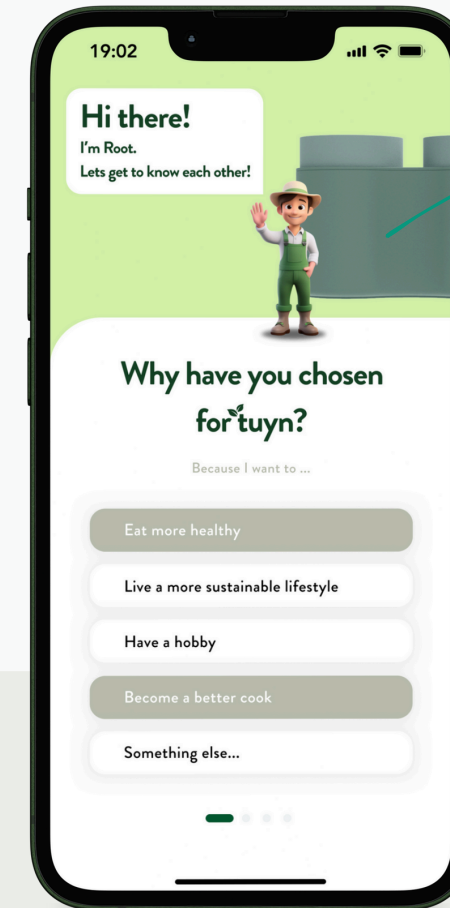
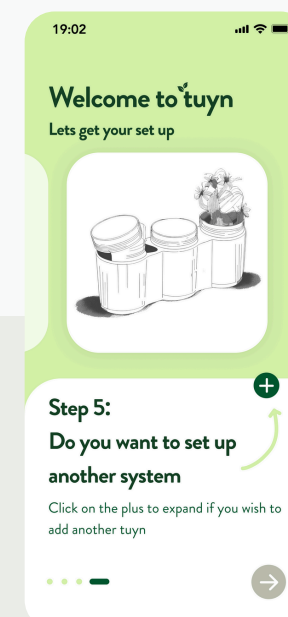
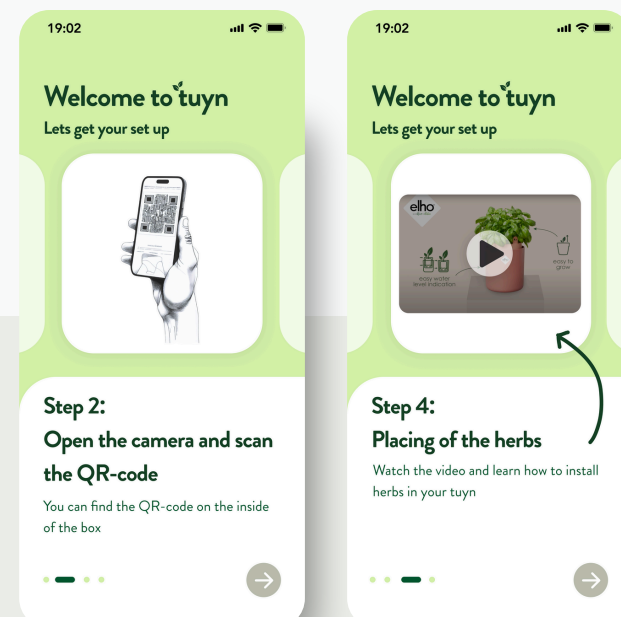
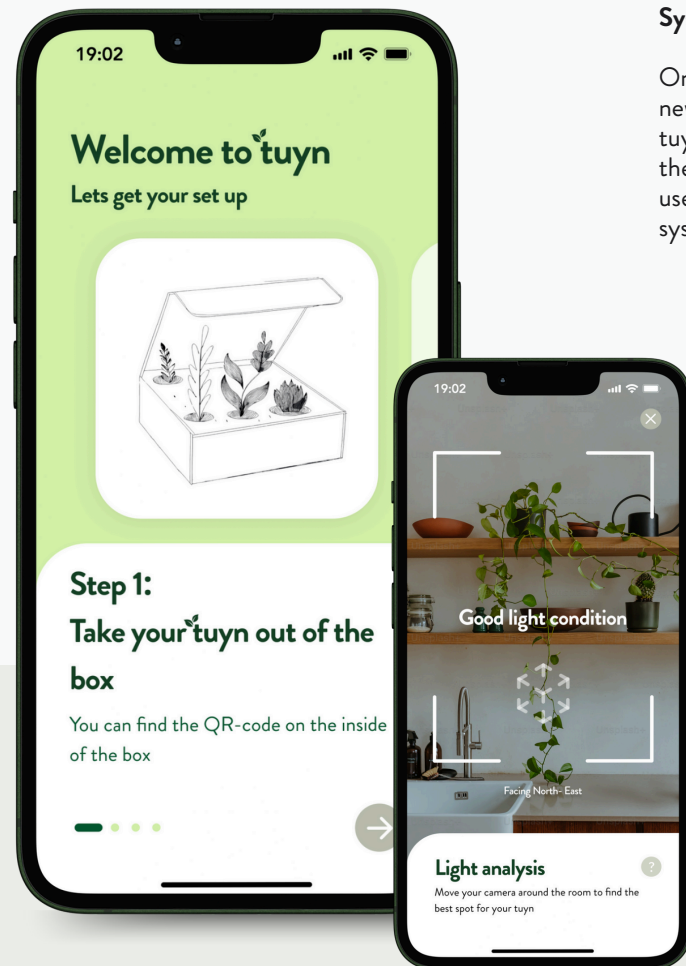
The designed interface serves as a suggestion of what this could potentially look like, but the focus is on the functionalities included throughout the interfaces.



System setup assistant

Once the app is downloaded to a mobile device, it assists new users in setting up their system. It unlocks the virtual tuyn via a QR code, provides a tutorial on how to operate the system, and includes an AR light analysis tool to help users identify the best spot in their home for placing the system.

Support & Guidance

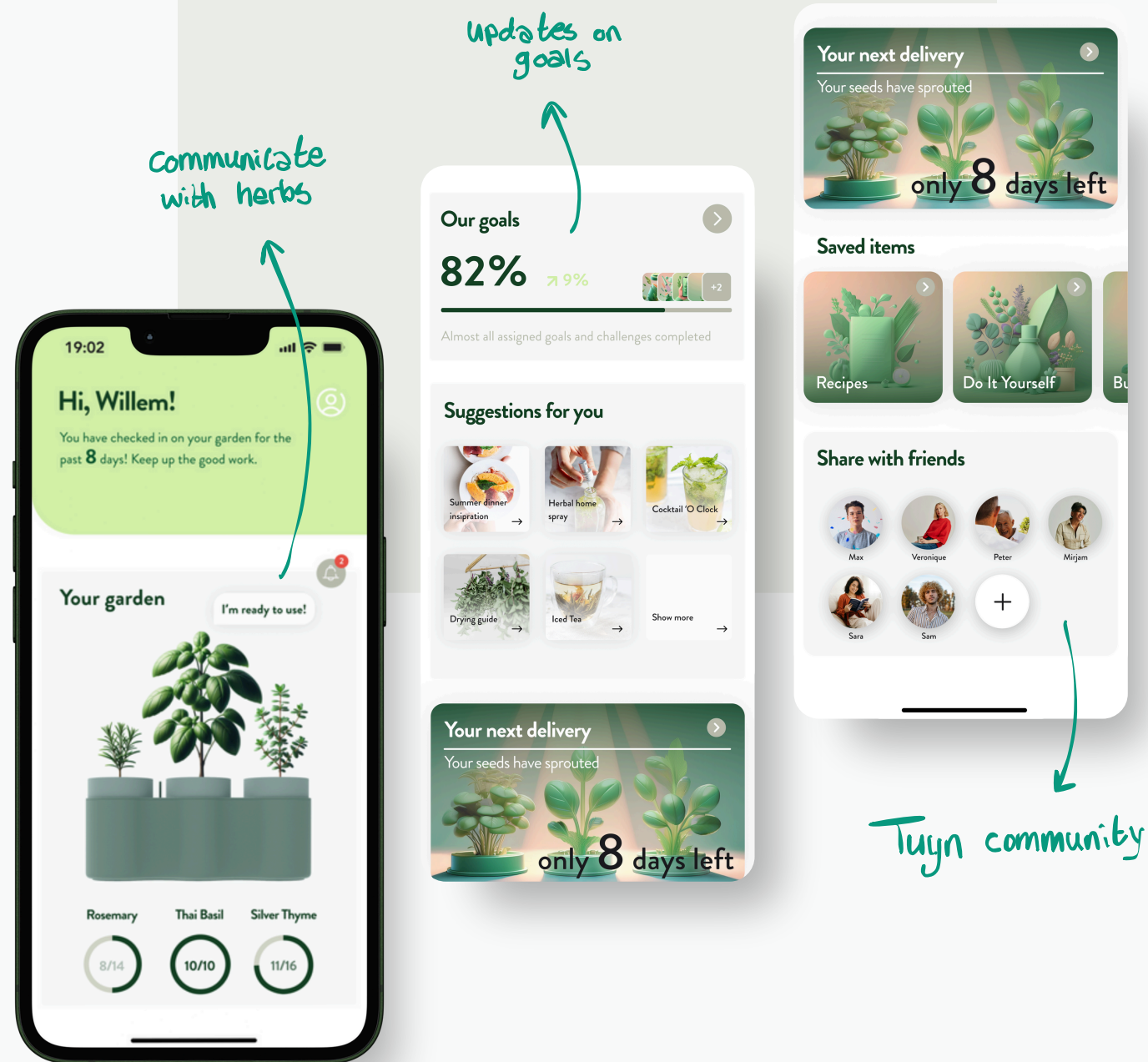


Adjustable to
personal purpose

Get to know

Once the system is set up, it is time for the user and the app to become acquainted. This is done through a personal assistant called 'Root', an AI-trained bot that will ask the user questions to help them better understand how this product should serve them in their daily life, how they want to be assisted, and if there are any specific goals they wish to achieve by using Tuyn. By gathering this information, 'Root' can provide tailored assistance to each individual user based on their motivations.

This information will also be useful for elho to understand consumer motivations for using these systems, allowing them to optimise their services based on this consumer analysis.



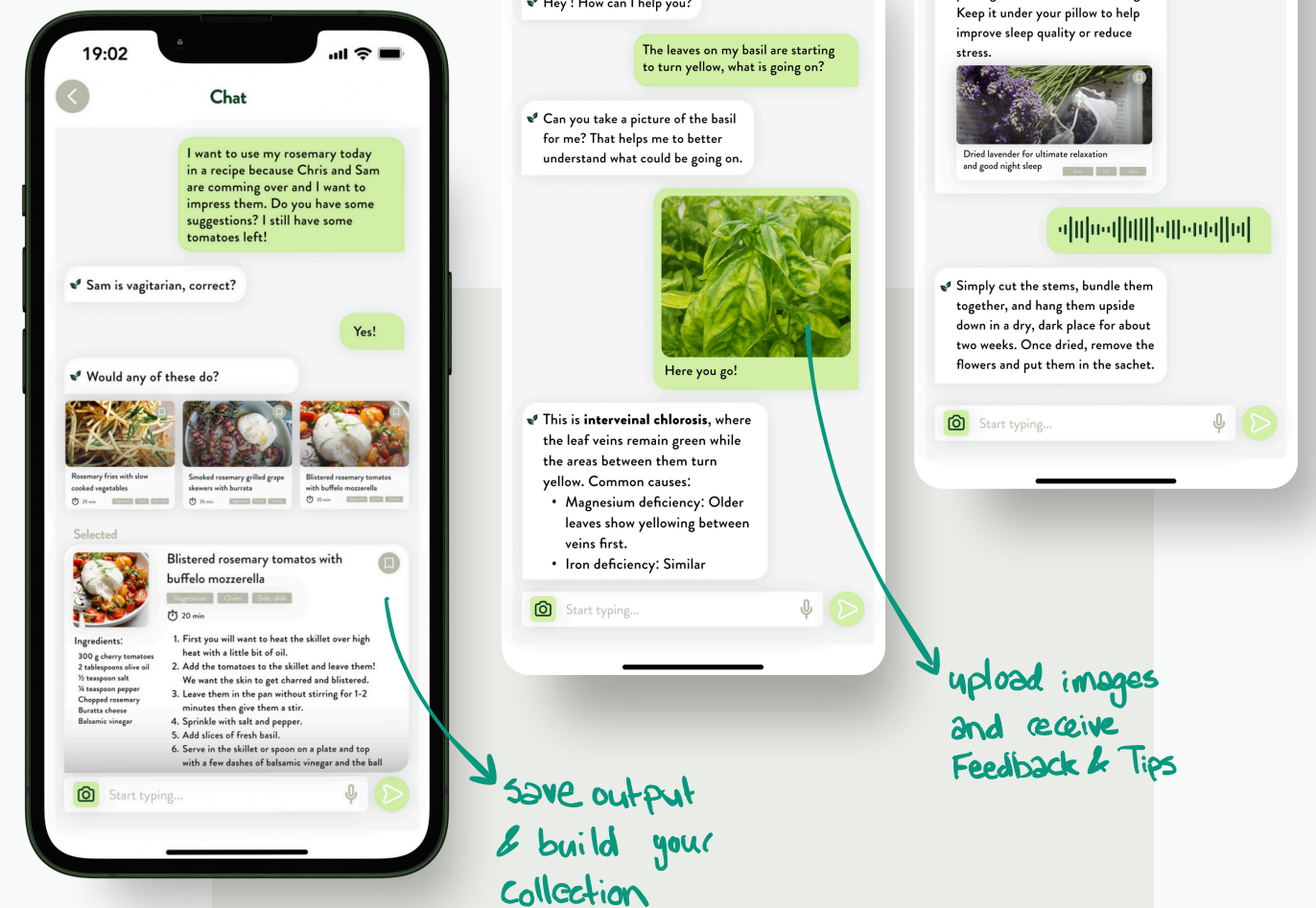
Homescreen

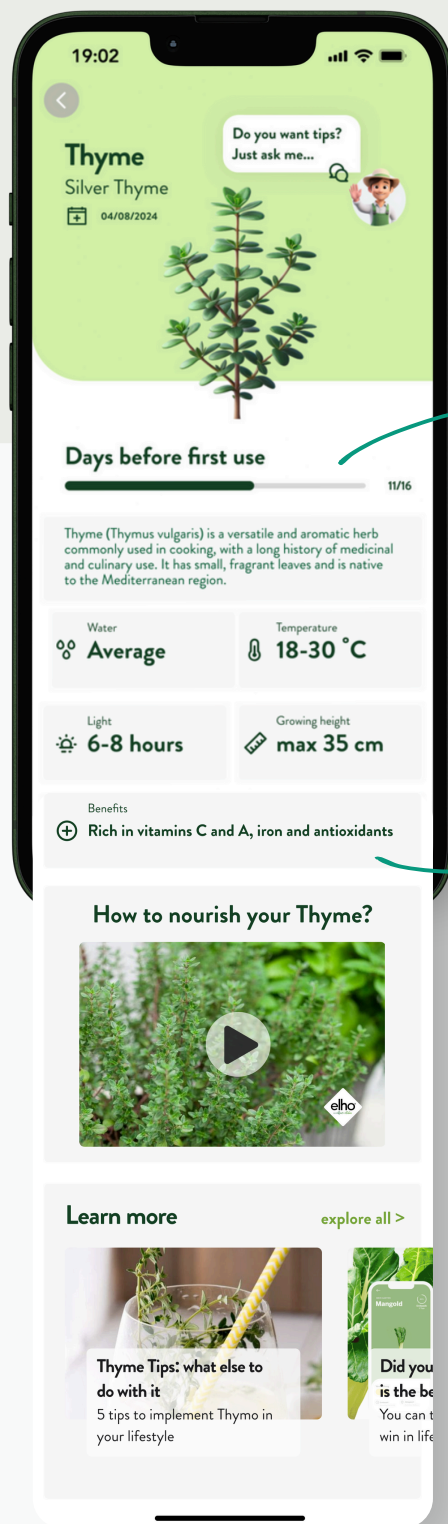
Once the setup is complete, the user is taken to the homescreen. This page displays their virtual 'tuyn', featuring statistics on the plants currently operating within the system. The virtual tuyn is a representation of the user real life systems and the virtual plant grow along with the real-life herb plants.

On the homescreen, you will also find statistics related to the goals they are working towards together, standard suggestions with inspiration for what you can do with the herbs you have growing in your system, a 'save items' folder to collect inspiration for later use, and the ability to share goals, recipes, and more with other tuyn users.

Chat function

Knowing how to use and integrate herbs into consumers' daily lives was one of the challenges identified in the research. Therefore, an AI chat function has been implemented to support consumers with their needs. By chatting with their personal assistant, Root, users can receive the assistance they require. Whether they have questions about plant maintenance, seek inspiration for herb use, want to improve their diet goals, or need dinner suggestions, users can ask anything. As the AI gathers data on user behaviour and through the setup of personal user profiles, it can assist users in a meaningful and relevant way creating a stronger connection over time. This fosters trust and provides the right support for getting optimal use out of the system and beyond.





Plant care and information

Each individual herb species has its own profile that offers information on how to best maintain the herbs, including educational tutorial videos and more.

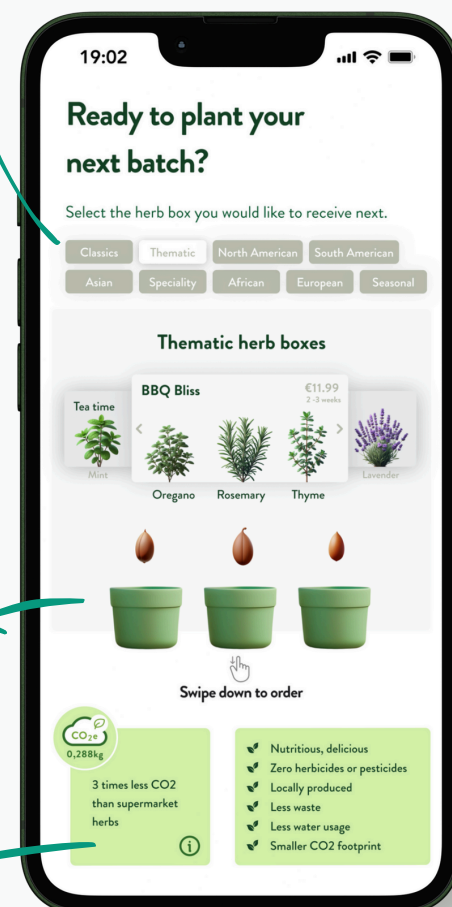
Growing status

educational information

Lots of options

easy payment

transparent

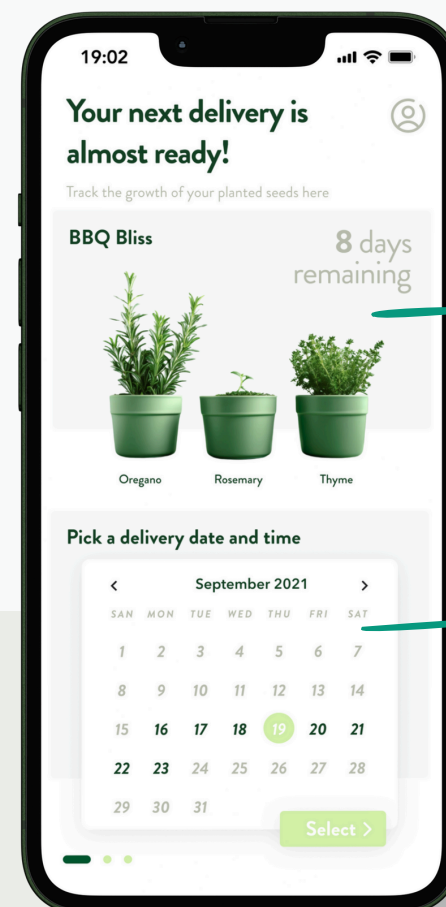


(Re)ordering process

Due to consumer hesitancy towards subscriptions, Tuyn encourages users to reorder herbs themselves by offering engaging incentives. A key feature is the virtual seed planting experience, which simplifies the reordering process. Users can select their next desired herb box from a wide variety of options and virtually "plant" the seeds within the app. This action initiates a real-life process where the chosen herbs are cultivated in a vertical farming lab.

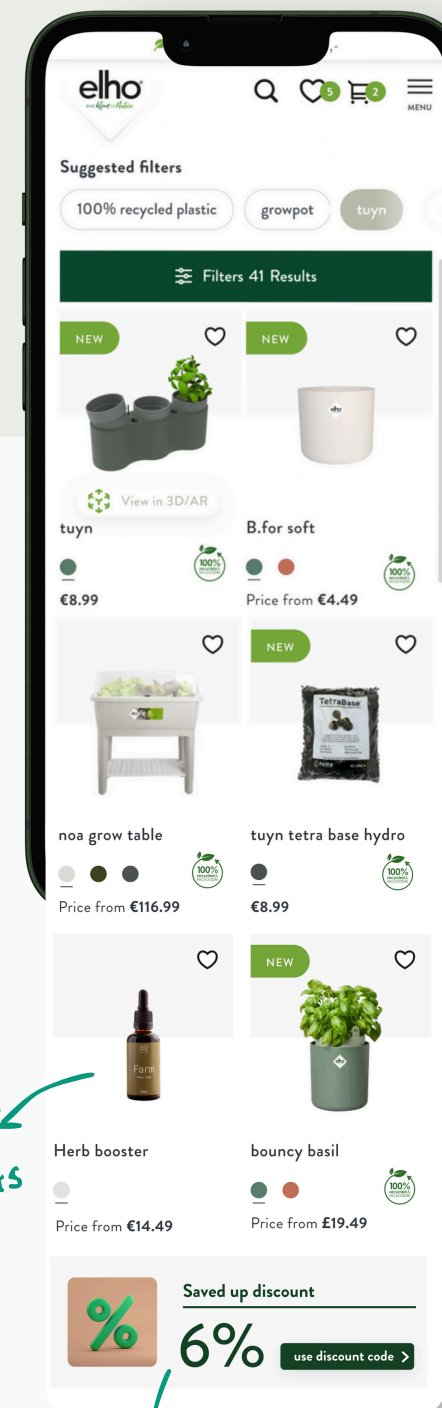
Webshop

Included in the app is also the elho webshop, where users can purchase individual parts for the Tuyn system, as well as additional products to enhance their growing experience, such as nutrients, as well as explore the full Elho product range. This allows them to further invest in their sustainable lifestyle by acquiring pots for repotting herbs, which make thoughtful gifts for friends and family. Additionally, users can browse through a variety of 'grow your own' products, encouraging them to fully embrace the elho lifestyle.



track delivery

select delivery date



herb nutrients

save up for product discounts

The app encourages consumers to plant early by making the initial stages of growth (sprouting and seeding) happen virtually. Meanwhile, in reality, their herbs are being nurtured in the lab. During this period, users can track the growth of their new herbs, set a flexible delivery date, and monitor their shipment.

Additionally, the app's AI assists users by predicting when their current herbs are likely to run out, helping them either use up the remaining herbs or plan for a seamless transition to the new batch.



Surprise subscription

Tuyn offers a subscription service where customers can receive surprise herb boxes, ideal for those who prefer this option over planting seeds. This service enables quicker delivery times, as the boxes include a random selection of herbs. Additionally, the boxes are more affordable, and the element of surprise adds excitement for consumers.

Li et al. (2023) discuss consumer satisfaction in curated (surprise) subscriptions, which are gaining popularity because they offer something new and exciting that people enjoy. The element of surprise adds an enjoyable aspect and simplifies the experience by removing the need to choose. Over time, as customers get used to these services, they look forward to receiving their boxes.

Gupta et al. (2018) support this, stating that surprise self-gifting has a significant impact on consumer behaviour. When individuals purchase surprise gifts for themselves, they experience feelings of excitement and anticipation. If the surprise is positive, it brings them joy, often sharing their happiness with others and strengthening their connection to the retailer. Even when the surprise is disappointing, consumers tend to seek a positive outcome by repurposing the gift for someone else. This makes surprise an effective strategy for retailers, as it can enhance customer satisfaction and loyalty (Li et al., 2023; Gupta et al., 2018).

Groen doeners

When consumers purchase herb boxes, a small percentage of the purchase is donated to elho's 'Groen Doeners' initiative, which aims to green neighbourhoods in the Netherlands that are in desperate need of nature in their surroundings. Users will receive updates when a new project has been completed which provides them with a sense of doing good.

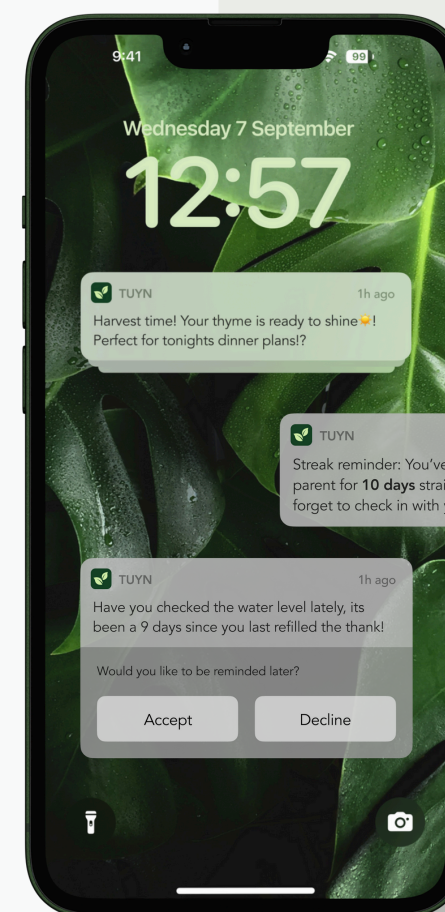
Plant scans

To help the app monitor plant growth, users are asked to occasionally take a photo of their garden. The AI analyzes these images to assess the current state of the plants and updates the information displayed in the app accordingly.

Widgets and reminders

The app also includes widgets and reminders sent by Root to ensure that consumers are reminded to check in on their Tuyn, getting notifications on when goals are achieved or to check the water level in the system.

home screen widgets



TUYN 1h ago
Goal achievement
"Woohoo! 3 new recipes cooked with your homegrown herbs this week! MasterChef in the making! 🥳"

TUYN 1h ago
Streak reminder
You've been an amazing plant parent for 10 days straight! keep it up and don't forget to check in with your herbs today 🌱.

TUYN 1h ago
Tip
Think your plant might be feeling under the weather? Try out the 'Plant Doctor' feature for a quick diagnosis! 🩺🌱

TUYN 1h ago
Its winter holiday season, would you like to plant your next batch of holiday herbs? 🎄🌱🍷🍷🍷

TUYN 1h ago
"Hey! Don't forget to give your plants their weekly boost of nutrients today! 🌱"
Would you like to be reminded later?
Accept Decline

9.3.2 Product design functionality

During the second co-creation session with two of elho's designers, an initial version of the product was developed based on the project brief. The images on this page illustrate the design choices and different functionalities incorporated into the design.



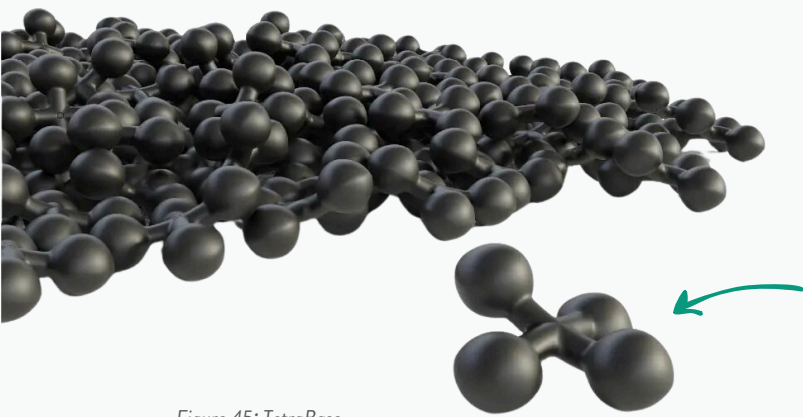


Figure 45: TetraBase



TetraBase

In the testing phase it was found that working with real soil leads to a lot of mess, mould and a dirty looking product. Therefore an alternative to this problem had to be found. An alternative was to soil was found and is a perfect match for this system, its called TetraBase (Figure 44)).

TetraBase is a specialised **hydroponic grow media** specifically designed for **deep water culture systems**, offering robust support for plants. TetraBase is reusable, eco-friendly, and highly durable, maintaining its structure through endless growth cycles. Unlike traditional clay balls, TetraBase is non-porous, which prevents nutrient leaching, and it does not attract pests, mould, water or root colouring or affect pH levels. TetraBase enhances nutrient uptake while ensuring a clean and efficient growing environment.

These plastic molecule shaped balls will be provided with the systems upon purchase.

Figure 45 provides a cross-section of the system's functioning. The TetraBase medium holds the herbs in place, enabling the roots to absorb nutrients from the water that enters through the holes in the bottom of the container, creating a hydroponic system.

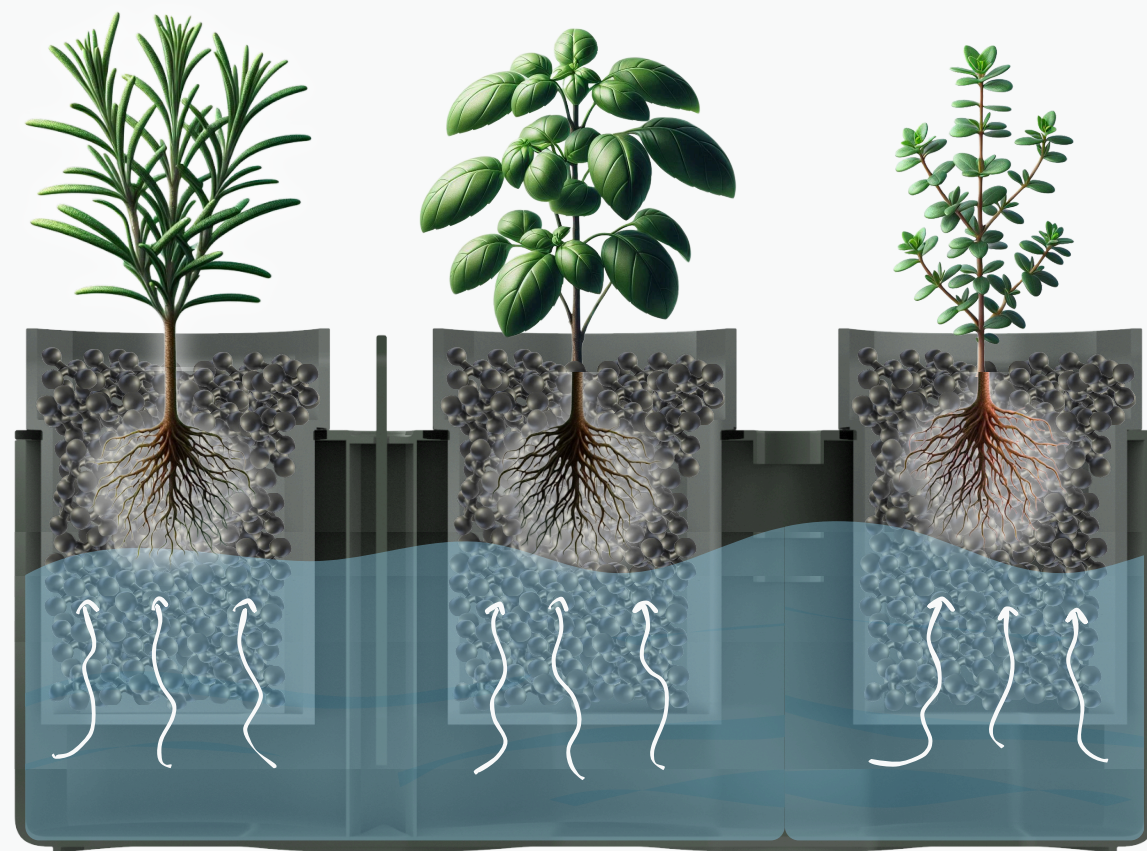


Figure 45: Cross section showing Tuyns' hydroponics system

9.3.3 Product design vision

Now that the design and functionalities of the physical product have been presented, it is time to outline the vision for this product. Another significant adoption barrier identified through the research was the lack of customization options across all available products. The interviews revealed that people seek products that reflect their personal values and match the aesthetics of their living spaces. Therefore, a vision for this concept was developed to satisfy a broad range of future users and ensure that customisability would not hinder adoption.

Based on the created personas (Appendix 12), the brand knowledge acquired, and the insights gained on production capabilities during my time at elho, combined with my personal vision for products, the following vision for the product emerged



The vision exists out of three different product ranges. For each range a moodboards (Figure 46) was crafted combining the look and feel for each product range as well as matching kitchen/living space environments. Several key words adhere to these moodboards. The created moodboards are:

Modern Basic:

This range should be designed as a basic entry-level model that is sleek and modern, complementing contemporary living spaces. It will feature a matte finish to align with modern day appliances and offer a neutral colour palette to enhance its understated but strong appearance.



Terazzo Traditional

This range is inspired by the elements of nature, with wooden ISG offerings being the most popular among participants due to their natural appeal and connection with plants. To enhance this connection, a more nature-inspired collection is needed. This range features natural brown tones and draws inspiration from the textures of elements such as stone and wood, resulting in a timeless and classic look and feel.



Ribbed funk:

The final approach takes a more bold stance by showcasing a vibrant and funky variant of the product. Drawing inspiration from elho's popular 'vibes' collection and modern day brands that resonate with the early adopter group of millennials, this product features a unique shape and serves as an eye catching design piece for any living space. With the Smeg kettle's popularity, this direction aligns well with that aesthetic. It caters to consumers looking for designer products that reflect their personal values and stand out in their home interior.

Figure 46: Moodboards product vision

Product ranges

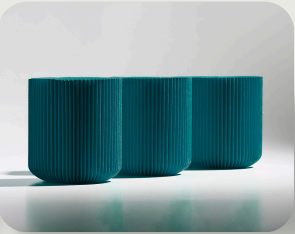
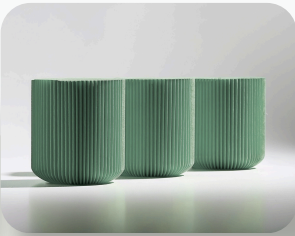
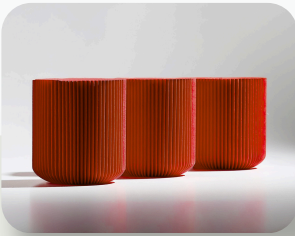
Below are visual representations of the three product directions, each aligned with a colour theory. Only the base of the product, the water tank, has the ability to be customised. The images and colours presented are a preliminary interpretation of the envisioned design for this product in its current form.



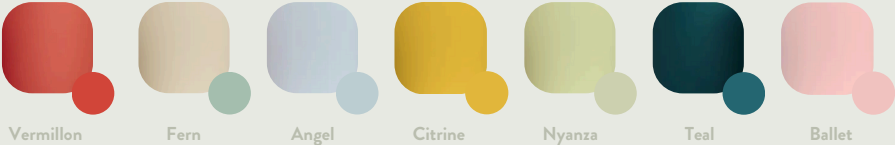
Proposed colors



MODERN BASIC



Proposed colors

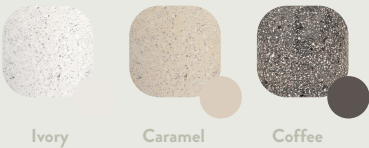


RIBBED FUNK

PRESENTING THE CONCEPT



Proposed colors



TERRAZZO
TRADITIONAL

Custom styles, flexible pricing

The customizability options available for Tuyn give consumers a wide range of choices to suit their preferred style. Despite offering three distinct design directions, only two different production molds are required. Both the "Modern Basic" and "Terrazzo Traditional" styles can utilize the same mold, with the difference in appearance achieved through varied textures. However, the "Ribbed Funk" design requires a separate mold, which increases production costs. As a result, this version would be positioned as the highest-priced option in the lineup.

This setup allows for a tiered pricing model, where more premium designs can be sold at higher prices, providing flexibility for different consumer budgets. Additionally, consumers can choose from three neutral container options (Figure 47) to complete their Tuyn system, further enhancing personalization.



Figure 47: Tuyn herb containers

Balancing quality and appearance

An important insight from the interviews revealed that plastic products are often perceived as cheap, which is not a desirable aesthetic. To avoid this, the final design for Tuyn should aim for a more luxurious feel. Since Tuyn doesn't feature integrated technology and is essentially a standard product, adopting a design with a more mechanical or machine-like appearance could enhance its perceived quality. Figure 48 illustrates where Tuyn should be positioned on the aesthetic spectrum, striking a balance between the look of a typical plastic product and that of a high-end appliance. The goal is for it to convey a sturdy, slightly mechanical appearance, without being viewed as either an appliance or a cheap plastic item.

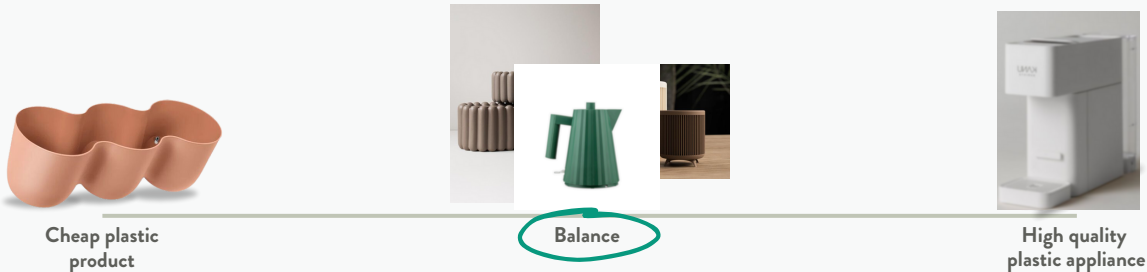


Figure 48: Balancing between a cheap plastic product and a high quality appliance

9.3.4 Branding & packaging of herbs

Due to time restrains there was not much effort being put in the branding for this concept however a view small start and suggestions have been made.

Name and slogan

The name Tuyn is a creative wordplay on the Dutch word "tuin," which translates to "garden" in English, reflecting the core idea of incorporating gardening into living spaces. This name highlights the focus on personal, small-scale gardening in a manner that is both familiar and unique. The slogan, "Cultivate Your Lifestyle," was chosen to capture the essence of the product. It highlights how Tuyn goes beyond growing herbs; it's about nurturing a greener, more sustainable lifestyle that resonates with the user's personal habits and values. Together, the name and slogan express the combination of personalisation and environmental consciousness central to the concept.

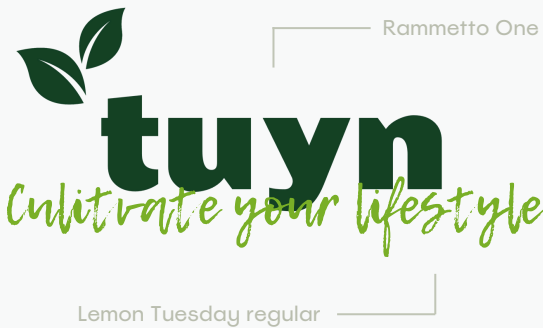


Figure 49: PlantLab patented herb delivery packaging (PlantLab, 2024)

Packaging

Shipping live plants presents significant logistical challenges, particularly in ensuring the herbs' (roots) remain alive until they reach the consumer. For a search for a suitable packaging solution, a potential partner was identified, PlantLab. PlantLab is a company with a patented packaging solution designed specifically for herbs which are being transferred from a vertical farming systems. This innovative plastic capsule keeps the roots in contact with water during transit, extending the shelf life of most herbs by two days (Figure 49). This solution is ideal for Tuyn, as it allows for a seamless transfer of the herbs into the system. The hydroponic setup ensures continued growth without the need for soil, keeping the process clean and user-friendly.

Archetypes

Based on the 12 brand archetypes created by psychologist Carl Jung in the 1940's (Figure 50) tuyn would fit in with two of these archetypes: **The Caregiver** archetype highlights the brand's commitment to compassion, care, and a desire to assist consumers in creating nurturing green spaces. Paired with **the Sage** archetype, Tuyn also expresses wisdom and expertise, providing valuable insights into sustainable living and plant care. This approach ensures that users feel informed and confident throughout their journey. Together, these archetypes strengthen Tuyn's mission: to help users not only grow plants but also cultivate a deeper connection with nature and enhance their well-being.

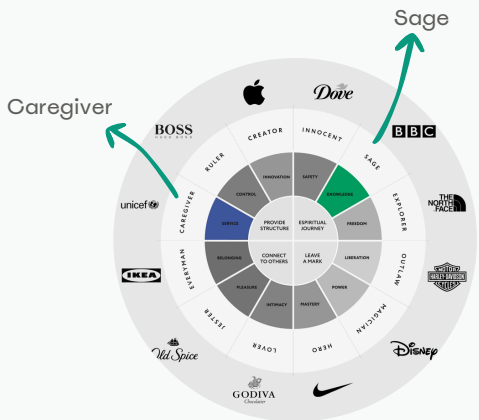


Figure 50: 12 brand archetypes (Maidment, 2024)

Look and feel

The look and feel of the Tuyn brand and its packaging should convey a fresh, youthful appeal that sparks desire and attracts a broad range of users, offering them a unique and engaging experience. While it's important for Tuyn to align with Elho's current branding and perception, it also has the opportunity to introduce its own distinct touch, allowing it to stand out in the market. An inspiring example of this approach is the award-winning herb packaging designed by Pond Design for Optima Planta (Figure 51), which beautifully illustrates the modern, appealing aesthetic envisioned for Tuyn.

Figure 51: Branding proposal (Optima Planta Sustainable Packaging Design By Pond Design, 2022)



9.4 Impact of the proposed concept

The proposed concept 'Tuyn' is the result of the design goal formulated based on the conducted research. Its impact can be described through the emotional and functional benefits it offers to consumers, as well as its unique selling point it has compared to those analysed in the competitive landscape.

Emotional benefits

The concept prioritizes the emotional connection between users and their personal green spaces. Through personalization and interactive features, consumers are not just growing herbs but nurturing a living part of their home environment. The experience is designed to evoke feelings of satisfaction, achievement, and well-being, as users see the tangible results of their care and attention.

Functional benefits

Functionally, the system addresses key pain points identified in the research on ISG, which included bad germination results, hobby over function, direct results, long growing times, subscription restrictions, and the ability to customize. The modular design, automated watering system, and AI-driven guidance ensure that the process is as effortless as it is rewarding, making it accessible to everyone, regardless of space or lifestyle constraints.

Unique Selling Point

What sets this concept apart is its ability to evolve with the user. Unlike traditional ISG products, this system grows alongside the consumer. It offers tailored advice, reminders, and implementation suggestions based on their unique preferences and needs like dietary goals. This helps to reinforce the consumer's commitment to a greener lifestyle.

On a more holistic view this concept also creates an impact on the company in the long term through:

- **Increases brand awareness and loyalty:** The concept boosts elho's brand visibility by providing engaging and useful experiences that resonate with customers, fostering long-term loyalty.
- **Manufacturing strength:** This concept uses elho's rich expertise and strength in manufacturing to provide a differentiating design made with quality. Additionally, it allows for customization and personal selection, which is also a new approach for elho's way of offering products to consumers.
- **Positions elho as a knowledge centre:** By integrating AI-driven guidance and personalized plant care support, elho establishes itself as a leader in plant care expertise, allowing for further growth in this strategic direction.
- **Expands target market:** The concept broadens elho's appeal by reaching a wider audience interested in sustainable living and personalized lifestyle products and services.
- **Shifts to a more product-service-oriented model:** By extending the customer experience beyond the initial purchase, elho expands its B2C channel and is able to gradually integrate more product-service offering to its portfolio. This creates new opportunities to gain access to new and deeper consumer insights, increase engagement, and generate ongoing revenue streams.

10

PARTNERSHIP AND BUSINESS MODEL

PRESENTING CONCEPT

This chapter explores the back-end of the proposed concept and introduces the selected potential partner, PlantLab. It also includes the business model canvas and value proposition canvas, which outline a strategic approach to transforming the concept into a tangible and viable offer.



CONTENT

- 10.1 Strategic partnership
- 10.2 Business Model Canvas (BMC)
- 10.3 Value Proposition Canvas (VPC)



10.1 Strategic partnership

To successfully bring this concept to life, there is a need for a partnering organization to provide the herbs, ensuring a seamless and sustainable integration of the product-service system. The herb provider plays a critical role in "closing the loop" by ensuring that the product remains both sustainable and locally sourced, aligning with the core values of the concept.

The search for a suitable herb provider was conducted through a combination of desk research and internal networking. A wide range of potential partners within the herb industry were evaluated based on a set of defined requirements and preferences. These criteria were created to ensure that the selected partner would not only meet the logistical needs of the concept but also align with its overarching mission of promoting a green and sustainable lifestyle.

The key requirements for the herb provider were as follows:



Local operations:

The provider should operate within the Benelux region, ensuring proximity to elho's headquarters and reducing the carbon footprint associated with transportation.



Sustainable operations:

Preference was given to companies engaged in vertical farming, reflecting a commitment to innovative and eco-friendly agricultural practices.



Sustainable cultivation purpose:

The provider must demonstrate a clear commitment to sustainability in its cultivation processes.



Variety and compatibility:

The ability to grow a diverse range of herbs and offer products compatible with the product's specifications was essential.



White-label offering:

Ideally, the provider should offer white-label products, allowing for a personalized branding to match with the elho brand.

After evaluating the brands found in the search, only a select set of companies met these criteria: Infarm, Growy, and PlantLab. However, with Infarm facing financial instability, the choice narrowed to Growy and PlantLab.

Upon further analysis, **PlantLab** emerged as the preferred partner. Their strong focus on sustainability, coupled with their strategic location in Den Bosch, close to elho's operational location in Tilburg, made them the ideal match for this concept. PlantLab's innovative approach to vertical farming and commitment to eco-friendly practices align perfectly with the concept's vision of fostering a sustainable and personalized green lifestyle.



10.2 Business Model Canvas (BMC)

A Business Model Canvas (BMC) is a strategic tool that allows businesses to visualise the core elements of their business model (Osterwalder & Pigneur, 2010). For the Tuyn concept, the BMC (Figure 52) is crucial for aligning business goals, product strategies, and customer needs. It helps stakeholders grasp how value is delivered to consumers, identify revenue streams, establish key partnerships, and understand the operational infrastructure that underpins this unique product-service system.

Key points from the created BMC (Appendix 14)

Customer Segments:

The primary target audience consists of urban, eco-minded consumers, typically between 25-40 years old. These consumers prioritize health, sustainability, and convenience. They are health-conscious, prefer fresh food options, and have above-average household incomes, making them more likely to invest in products that support a sustainable lifestyle.

Value Propositions:

The emotional and functional benefits of Tuyn are already described in chapter 9.4. Additional value propositions for elho include: market differentiation, customer retention, enhanced brand image and awareness, opportunities for product line expansion, leveraging data for product development, attracting new customer segments, and enhanced customer experience. For the vertical farming partner the added value lies in growth efficiency by decreasing growth time and co-development opportunities to explore different herb offerings.

Key Resources:

The system relies on several core resources, including distribution networks, branding, data security, and more. A significant partner, Plantlab, providing high-quality herbs optimized for indoor growth, ensuring the product's success. The mobile app also plays a critical role in maintaining customer engagement and tracking plant growth.

Revenue Streams:

Revenue is generated from the initial purchase of the product and recurring revenue from herb box subscriptions. There is also potential for additional streams through premium subscriptions and customizable features for users wanting more tailored experiences.

Key Activities:

Key activities include product design/testing/development, marketing/sales and customer support, supply chain management, distribution and logistics, branding and packaging and continuous quality control checks to maintain high standards for consumers.

Cost Structure:

The primary costs involve research and development, distribution logistics, and marketing efforts. A contracts with Plantlab and other possible partners involved in launching tuyn.

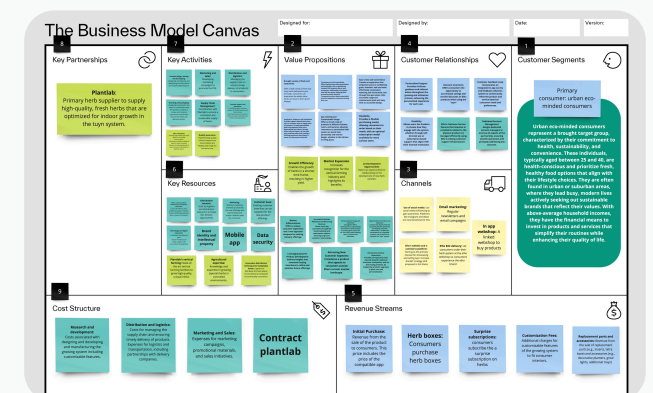


Figure 52: Business model canvas (Osterwalder & Pigneur, 2010) (Appendix 14)

10.3 Value Proposition Canvas (VPC)

The Value Proposition Canvas (VPC) helps ensure that a product or service is positioned to solve consumer problems and provide real value (Osterwalder et al., 2014). By breaking down customer jobs, pains, and gains, and matching them to the benefits offered by the product, this canvas is a tool used for aligning customer needs with product features. For PSS like Tuyn, this is a relevant step to ensure that the system is not only functionally effective but also emotionally engaging and relevant to the target market. For a more in depth understanding of this model, see Appendix 15.

Main key points from the created VPC (Figure 53) include:

Consumer profile

Consumer jobs (things the consumer tries to get done):

- Culinary skill improvement made easy
- Create a hassle free routine
- Healthier eating
- Living a 'greener' lifestyle
- Aesthetic and personality enhancement

Pains (experienced when trying to get the job done):

- Herb Spoilage
- Lack of knowledge
- Pesticides & herbicides
- Limited space
- Unsustainable behaviour
- (Non-flexible) subscription models

Gains (how consumers measure the succes after getting the job done):

- Health & sustainability
- Green surroundings
- Customization and personalized features
- Taking care of something
- Easy learning
- Being rewarded
- Transparent and supportive brands

Value map

Products & Services (included in the value proposition):

- Tuyn herb garden system including a physical product, supporting application, and reordering system
 - Product: customizable design
 - Application: educational content, support service, elho webshop,
 - Reorder & subscription systems

Pain relievers (how the offerings reduce, relieve or minimize the consumer care about):

- Enhanced customer support
- Space efficient
- Reduce spoilage
- Provide knowledge
- Transparent and sustainable
- Affordable
- Addressing emotional and practical barriers

Gain creators (how the offerings produce, increase or maximize outcomes or benefits):

- Extend herb freshness
- Health support
- Easy to use and maintain
- Sustainable
- Save up for discounts
- Personalized experience

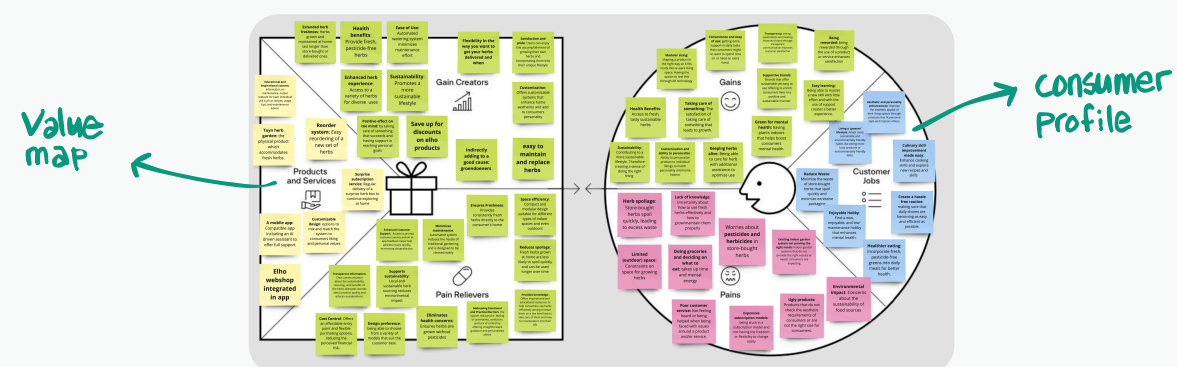


Figure 53: Value proposition canvas (Appendix 15)

11

EVALUATING THE CONCEPT

PRESENTING CONCEPT

This chapter focuses on the validation and evaluation of the proposed concept 'tuyn'. It provides insights into stakeholders' perspectives towards the concept and validates the concept based on its desirability, feasibility, and viability.



CONTENT

- 11.1 Concept validation through business stakeholders
 - 11.1.1 Plantlab
 - 11.1.2 Elho
- 11.2 Innovation Sweet Spot
 - 11.2.1 Desirability
 - 11.2.2 Feasibility
 - 11.2.3 Viability
 - 11.2.4 The shift from traditional ISG to Tuyn



11.1 Concept validation through business stakeholders

11.1.1 Plantlab

Confidential Appendix (D)

Confidential Appendix (D)



Figure 54: Visit PlantLab

11.1.2 Elho

Confidential Appendix (E)

produced greenery. The cost sensitivity of the Benelux market creates additional challenges in making the concept desirable and profitable. Mr. Kers also pointed out that vertical farming would make more sense in regions with difficult geographic locations and/or with challenging weather conditions, such as Hawaii or the Bahamas, where local food production is limited and expensive. In these locations, there are greater opportunities for impact and sustainability. Elho shares this viewpoint and remains sceptical about the immediate potential of the concept in more saturated and competitive markets like the Benelux.

4. Concerns over logistical and market challenges

Both Elho and PlantLab acknowledged the difficulty of creating a sustainable and scalable business model within food retail. Logistics and transportation have consistently proven to be significant obstacles, elho is cautious not to "burn their hands" on these complex logistical challenges, which have caused other companies to struggle or fail.

5. Accessibility in the Benelux region

Another point of concern was the market conditions in the Benelux region. Mentioned by Mr. Kers, this area has a luxury of abundance, with every conceivable vegetable, herb, or salad crop readily available at low prices. Consequently, it is difficult to convince consumers to choose more expensive alternatives like organic or locally

11.2 Innovation Sweet Spot

Created by well-known design consultancy IDEO is the 'innovation sweet spot model' (Figure 55) which serves as a tool to evaluate the potential success of (new) ideas across three critical dimensions. The model includes Desirability which focuses on creating solutions that are both accessible and valuable to users, ensuring whether the ideas is solving the right consumer problems. Feasibility assesses whether the envisioned product/service can be practically developed and implemented and thus strengthens your business. Viability examines the economic and operational aspects, ensuring that the concept is sustainable and effective in the real world (Orton, 2019). Finding equal harmony among these three constructs helps to develop a proposition that has strong potential for success.

This model deems the most appropriated model in relation to the objectives of this thesis and it will be used to evaluate the impact of the developed concept on these individual constructs, comparing it to the initial product category of ISG.

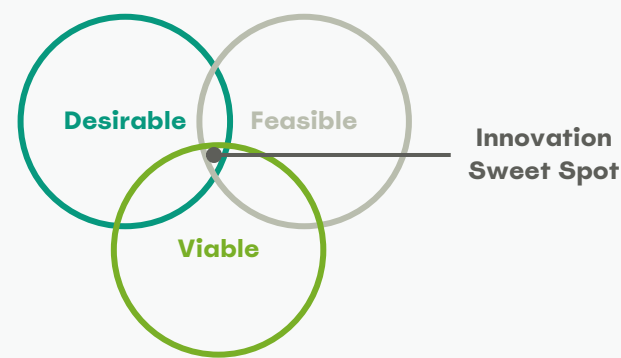


Figure 55: IDEO's Innovation Sweet Spot model (IDEO, 2009)

11.2.1 Desirability

The desirability of the 'Tuyn' concept is closely tied to its ability to meet the (latent) needs of consumers for fresh, locally grown, and sustainable herbs. Today's consumers are looking for transparency (Veltri et al., 2020) and sustainability in brands, products, and services that align with their values (Lim et al., 2022), and the Tuyn concept is designed to cater to these needs. Both the service and the product have been designed to satisfy users optimally, making it extremely user-friendly and providing maximum support in running the system.

Key features of the concept, such as the ability to customize the product, flexibility in reordering, and additional features that support a greener lifestyle, further enhance its appeal. By providing a seamless user experience and strong support for managing the system, Tuyn aims to ensure that the product remains attractive in the long term, encouraging continued engagement and usage.

The concept is tailored for urban dwellers who are early adopters and are more willing to experiment with new ideas and technologies, but it is designed to have broad appeal. This aligns well with elho's philosophy of "design for all," creating potential for the product to reach a wider audience beyond its initial target group. Furthermore, by incorporating modern AI technology to simplify consumers'

lives, 'Tuyn' meets the current market demand for innovative and more sustainable solutions that seamlessly integrate into daily life and simplify consumers' lifestyles. However, there are several factors that could pose a threat to the desirability of the Tuyn concept; for example:

Service performance:

The attractiveness of the concept heavily relies on its ability to deliver on its promises, particularly in providing fresh herbs. Any failures in the supply chain or logistical challenges could negatively impact consumer trust and satisfaction, reducing the appeal of the product.

Marketing and branding:

The success of the concept partly depends on its launch strategy and the effectiveness of its marketing and branding efforts. If the marketing fails to clearly communicate the benefits of the product or resonate with the target audience, adoption rates may be lower.

Herb competition:

In a turbulent market where consumers already have easy and affordable access to herbs, persuading them to choose a potentially more expensive alternative will be difficult. The concept needs to demonstrate its added value and differentiate itself from existing products to justify its value proposition and price.

11.2.2 Feasibility

From a technical and design perspective, the feasibility of the Tuyn concept appears to be promising. This is due to the combination of Elho's expertise in product development and PlantLab's advanced infrastructure in controlled-environment agriculture. However, there are significant challenges that need to be addressed in terms of logistics and scalability.

Factors Supporting Feasibility

- **Product development:** Elho's experience and specialization in product design and manufacturing will

ensures that creating the Tuyn systems hardware will not be a challenge.

- **Technical expertise:** PlantLab's technology ensures consistent production quality and supply, with their controlled-environment agriculture expertise providing a solid foundation for growing the required herbs.
- **App development and integration:** Elho can effectively develop a user-friendly app by collaborating with third-party developers, ensuring seamless integration and user experience.

Challenges to Feasibility

- **Logistical complexity in last-mile delivery:** Elho's reluctance to handle the logistics of live plants adds complexity to the feasibility of the concept. The supply chain required to maintain the quality of live herbs during transport and delivery is complex, and managing these logistics will be crucial for scalability.

11.2.3 Viability

The viability of the Tuyn concept hinges on establishing a sustainable and profitable business model while managing logistical, operational, and market challenges. There are several factors that could enhance the economic sustainability of the concept, but also significant risks that need to be addressed.

Factors Supporting Viability

- **Increased sales and brand awareness:** The Tuyn concept aims to boost product sales through enhanced brand visibility and a shift to a direct-to-consumer (B2C) approach. This strategy could create demand for additional lifestyle products, increasing customer retention and generating recurring revenue.
- **Consumer insights and loyalty:** Elho can use customer data to continuously optimize its service and adapt to evolving consumer needs, which could enhance satisfaction and long-term loyalty.
- **Flexible product offering:** Offering herbs at various growth stages allows for adaptability in supply chain management, potentially being able to better cater to both immediate and long-term demand.

Challenges to Viability

- **Logistics and operational risks:** The concept introduces more risk due to the involvement of live plants, which are inherently more challenging to manage in terms of supply chain logistics. Maintaining the quality and freshness of perishable goods in any delivery process is complex and costly.

- **Revenue model:** The revenue model for the Tuyn concept is still to be developed, and it is unclear whether it can become a profitable business. The economic viability will depend on balancing production costs, logistics, and pricing to ensure that the concept can generate a sustainable profit.
- **Managing fluctuating demand:** Handling fluctuating demand for a diverse array of herbs is logistically challenging. While the proposed solution of "planting digitally ahead" (forecasting and pre-planning herb growth based on projected demand) could mitigate some risks, it remains to be seen if this approach will work effectively in practice.
- **High costs:** Advanced packaging, delivery, and logistics add substantial costs, potentially impacting margins and requiring consumers to pay a premium, which may not be feasible in markets with cheaper alternatives.
- **Dependency on external partners:** The viability of the Tuyn concept would be strengthened if elho could manage herb production themselves by adopting their own vertical farming installation. This would allow to directly control supply, manage costs, and optimize the logistics process. However, establishing such infrastructure would require a significant upfront investment and commitment to a new business model.
- **Supply chain strategy:** Elho must develop a robust supply chain strategy that accommodates partner limitations while ensuring reliable delivery.
- **Scalability and market expansion:** Long-term viability will depend on expanding beyond the initial target market to areas with less local herb production, offering additional revenue opportunities.

11.2.4 The shift from traditional ISG to Tuyn

The created concept 'Tuyn' shows a shift in desirability, feasibility, and viability when compared to the initial ISG PSSs that were explored as a starting point for this thesis.

Research on current ISG PSSs revealed that these models tend to be more feasible than the created concept. This is mainly because they focus on growing plants from seeds, which simplifies logistics and operations, and they have fewer interactive complementary applications, opting for a simpler approach. However, despite their feasibility, it was found through the research that ISG models have lower desirability. Many of them failed to capture consumer interest or maintain engagement, as demonstrated by businesses like Ava Garden, Bosch, and Prêt à Pousser, which either went (temporarily) out of business or struggled to maintain their presence in the market due to increasing competition and/or market saturation. Consequently, the viability of these ISG systems is also questionable, given the large number of similar offerings and the difficulty in differentiating themselves in a crowded market. This positioning is visually represented in Figure 56, where the ISG systems are plotted within the innovation sweet spot model.

However, the new concept represents a shift across these three pillars. While this new concept introduces new risks and complexities, it does address all the shortcomings of the initial ISG models by aiming to improve desirability from a consumer perspective. As such, the feasibility and viability of the new concept remain less certain due to undeveloped elements, such as the absence of a fully developed financial business plan, pricing strategy, revenue projections, added values, and funding sources. Therefore, while a preliminary

visual representation of the Tuyn concept's position within the innovation sweet spot model is depicted in Figure 56, it is still an estimation based on the current concept development with the potential to be improved in future developments.

In summary, while the Tuyn concept is technically feasible due to the combined expertise of Elho and PlantLab, its operational feasibility will rely on overcoming logistical challenges and developing a scalable business model. By capitalizing on its strengths and addressing its potential risks, Tuyn could position itself as a more viable offering in the market. Although this thesis has fully optimized the product and service from a consumer perspective, the concept's desirability still needs validation through pilot tests and consumer panels. A strong branding and marketing strategy will be essential to support a successful launch for Tuyn.

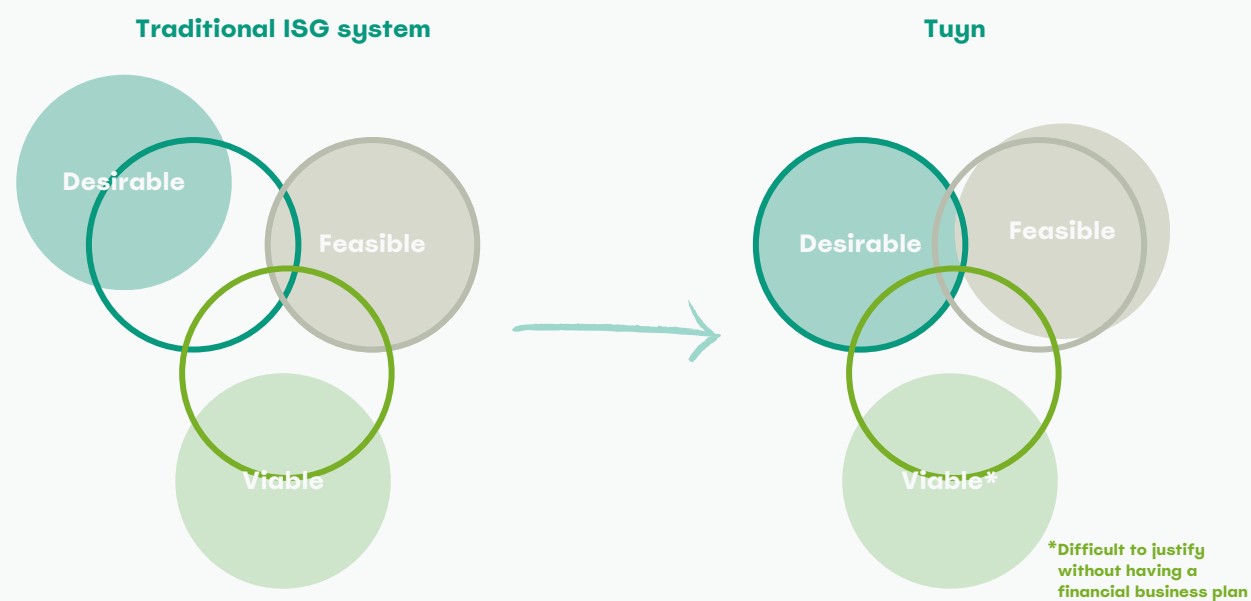


Figure 56: Analysis innovation sweet spot traditional ISG PSSs vs. the proposed 'Tuyn' concept

12

CONCLUSION

This final chapter presents the conclusion of this thesis, summarizing key findings and answering the research questions. It also includes the limitations, along with recommendations for improving the concept developed in this thesis. Additionally, suggestions for future research will be provided, followed by a personal reflection on the overall thesis journey.



CONTENT

- 12.1 Theoretical contributions & practical implications
- 12.2 Limitations
- 12.3 Recommendations and future research
- 12.4 Personal reflection
 - 12.4.1 Process
 - 12.4.2 Personal



12.1 Theoretical contributions & practical implications

This thesis aimed to explore the intersection of consumer behaviour and strategic business model innovation, specifically within the indoor gardening industry. Through a comprehensive analysis of this industry, focusing on Indoor Smart Garden (ISG) systems, a Product-Service System (PSS) was developed for elho Group, the case company. This analysis included an extensive literature review, qualitative empirical research, product testing, observational analysis, and several creative sessions.

RQ1

The first research questions stated: **What are the key challenges, opportunities, and drivers that influence the adoption of a new product-service system in the indoor gardening sector offered for a purpose-driven brand?** Based on the findings, one of the challenges in the ISG market is the high level of competition. Many brands offer similar products and services, making it difficult for a late entrant to differentiate and dominate the industry. In order to achieve this, the offering needs to stand out through a well-designed and functioning product and exceptional customer service, thus maintaining high levels of market demand and consumer satisfaction. Consumer experience and product testing throughout the thesis have revealed other specific challenges faced by ISG systems. These include issues such as poor germination rates, unfulfilled promises, long growing times, UV lighting that detracts from the atmosphere, catering to a niche user group, and systems with low-effort input that result in only medium satisfaction. Furthermore, keeping consumers engaged for a long period of time presents another challenge. The business model must strike a balance between giving consumers the freedom and support they desire ((Tukker, 2015), Borg et al., 2020)), while also ensuring enough recurring revenue to make the offering economically viable (Honore et al., 2022). The challenge lies in providing flexibility without creating the feeling of being trapped in a subscription model.

Knowing this, there are opportunities for this purpose-driven brand (elho) to create a differentiated PSS that meets (latent) consumer needs. To succeed, elho’s offering must unlock latent consumer needs by creating a compelling value proposition that includes both unique product features and emotional benefits. A balanced pricing strategy is essential, where the product should be aesthetically pleasing, customizable, and modular to align with different interiors as well as personal values and priced competitively to encourage adoption of a novel PSS. Also, by enhancing consumer experience between the user, the product and the service helps in creating a more desirable offering. This involves providing the right level of support and engagement, clear communication of long-term

benefits, and additional resources or knowledge to help consumers succeed. By doing so, elho can develop a unique value proposition in the market and gain market competitive advantage, increasing both the perceived value and the likelihood of adoption.

The theoretical contribution of this study is the identification of factors influencing the adoption of PSS within the ISG industry. A conceptual model was developed through an extensive literature review on adoption behaviour towards PSS and was tested on urban zillennials (or yuzennials) to uncover the key factors affecting consumers' intentions to adopt. The result of this study showed that the most prominent adoption barriers include product features —especially size, aesthetics, and customisability—alongside consumers' lack of trust (Borg et al., 2020) in both the product and their own capabilities. Service attributes involving assistance and support positively influences adoption as well as emotional benefits like satisfaction, enjoyment, and educational value. Additionally, the ease of use, which encompasses maintenance (Tunn et al., 2019), and concerns regarding high costs (Yu & Sung, 2023) and ongoing expenses, are all prominent factors and barriers that influence the consumers' decisions to adopt a new ISG PSS. These results contribute to

RQ2

Understanding these findings has provided the foundation to answer the second research question: **How can an understanding of these factors result in strategic decision-making and future growth strategies?** This was particularly focused on shaping a new approach to service-related innovation, providing practical implications. The created approach focuses on becoming a "trusted partner in plant care," emphasizing support for both plants and their owners through product and service offerings, thereby creating continuous value beyond the initial purchase moment and meeting modern consumer expectations.

To achieve this, a shift from a primarily B2B approach to a more B2C-oriented strategy is necessary. This expansion, which supplements rather than replaces the current B2B

approach, allows elho to build direct consumer relationships and quickly adapt services to evolving consumer needs, fostering long-term loyalty. Strategic partnerships will also be a crucial aspect to realizing service offerings and creating strong value propositions.

Final created concept

Based on this knowledge, a new concept, "tuyn," was created to provide a user-centric and result-oriented PSS. This concept offers year-round access to a diverse range of high-quality, locally grown herbs, with a focus on providing convenience and support for consumers at every stage of their journey toward a green lifestyle.

"Tuyn" adapts to individual needs by offering automated features, flexibility in ordering and reordering, and an AI-driven personal guide to enhance the indoor (herb) gardening experience, shifting the focus from growing toward maintaining and implementing herbs effectively in everyday life.

Exploring strategic partnerships

While elho flourishes at designing and manufacturing high-quality products, implementing a service model poses its challenges. Strategic partnerships have been explored during an iteration in this thesis (Appendix 16) and showed potential to greatly benefit elho. The focus is on enabling elho to bring their products to market without taking on the full logistical or operational burden. By collaborating with established partners in a specific industry, such as the food delivery industry, elho can tap into new customer segments and establish a more practical route to market. These strategic partnerships would also enhance brand awareness by associating elho's product with companies already known for their commitment to sustainability and quality. It is suggested to investigate strategic partnerships where elho can combine forces with others to create new value propositions, reducing the risk of failure and potentially launching a successful PSS.

Potential of an indoor herb garden product

The indoor herb garden concept developed in this thesis shows great potential for further development. Designing a product that maximizes herb growth while also being a luxury item in the kitchen could cater to both practical and aesthetic consumer needs. The customization aspect of the product adds value by creating an engaging consumer experience, further enhancing brand perception.

Contribution

The results of this thesis contributes to existing literature by offering insights into the adoption of Product-Service Systems (PSS) within the indoor gardening industry. Firstly, the research builds on established theories and models of consumer adoption behaviour related to PSS. It combines

this with an understanding of business model innovation through servitization and thorough market research, leading to a comprehensive overview of current market offerings. An in-depth analysis of user experiences was conducted by examining online reviews and gathering additional insights through product testing. This process identified key challenges that serve as the foundation for potential improvements aimed at increasing consumer adoption and desirability.

12.2 Limitations

For Elho, the results of this thesis offer insights into entering the service space, expanding into new markets, and attracting a broader customer base through a more B2C-oriented approach. However, there have been limitations to this study which will be presented in this section.

Sample size

The initial research primarily focused on a specific target group, being named "Yuzennials," which may have been too narrow to capture the broader potential of the concept. Especially with the relatively small sample size of 11 participants to test the adoption intention with, a more extensive consumer study could be conducted with a bigger and more diverse group of.

Research bias

Relying on qualitative methods, like semi-structured interviews, product testing, and observational analysis, could introduce subjectivity. While these methods provide deep insights, they may lack the objectivity and scale which quantitative data can offer.

Geographic focus

The research specifically focused on the Benelux region. The findings should not be generalized and applied to other regions as market dynamics and consumer perceptions can vary across different geographic locations.

Implementation challenges

Implementing services alongside products is a complex challenge. This thesis primarily focused on consumer adoption behaviour, with less emphasis on the logistical and operational complexities of implementing the proposed concept. This leaves a gap in understanding how to create a financially promising, operational feasibility, and scalable business model. Once these foundational elements are in place, a pilot program should be launched to test all aspects in practice, assessing the model's feasibility, viability, and desirability once more for both consumers and partners involved in the PSS.

Uncertainty in Strategic Partnerships:

Strategic partnerships are suggested as part of the growth strategy; however, their success is uncertain and depends on factors beyond elho's control, such as market conditions, interests of the partner, and shifts in industry trends. The ability to establish and maintain these partnerships represents uncertainty that could impact the long-term success of the proposed concept.

12.3 Recommendations and future research

Based on the research and its outcome, certain areas have either not been (deeply) explored or have newly emerged, presenting recommendations and interesting opportunities for future research or development. The following are the key areas that deserve further exploration.

Future research should explore a more diverse demographic group of future consumers to identify if the product resonates with other consumer segments. A larger sample size and a more quantitative approach would create insightful results to validate the findings and provide statistically significant insights. To test the desirability of "tuyn", this approach would be beneficial. Testing this in other regions outside the Benelux could deliver interesting insights in finding a better fit elsewhere.

As mentioned earlier, it is recommended that elho further explores the concept, also from a business perspective, developing a more comprehensive concept that addresses pricing models, financial projections, launch strategies, scalability, and the potential impact on the company's operational structure. Next to that a resonating marketing and branding strategy is needed including packaging design, social media campaigns which resonate with the target audience.

The created future vision for elho to become a partner in plant care by adopting a more B2C-oriented approach, provides a strong strategic foundation for future growth. To realize this vision, Elho could explore different industries and expand its product or service offerings by introducing simple services that enhance the overall customer experience. Leveraging its design expertise, Elho can build customer loyalty through continued engagement beyond the initial purchase. Additionally, Elho could position itself as a lifestyle brand by utilizing targeted social media marketing to increase brand awareness, enabling a more direct relationship with consumers which is necessary to reach this B2C approach.

The question remains: should elho take this risk and change how it traditionally conducts business? While it is always important to explore different methods of expanding business, implementing a PSS of this complexity may be too ambitious as a first step. Considering the resistance from consumers, elho should avoid adopting subscription models and focus on alternative strategies that are more in line with customer expectations. To maintain relevance with customers beyond the initial purchase, elho should consider

exploring uncomplicated service-based approaches or long-lasting experiences.

These suggestions for further research could help elho continue to build its business by uncovering new opportunities for value propositions and strategic partnerships. By exploring these areas, Elho can strengthen its market presence, enter new segments, and continue to innovate in offering products and services that appeal to consumers. Continuous exploration and refinement will ensure that elho stays ahead in a changing world while remaining true to its purpose.

12.4 Personal reflection

12.4.1 Process

Overall, I believe the process I created throughout this project ended up being a well-structured and logical approach to creating rich and relevant content. The double diamond method provided a strong foundation for my approach, where the moments of divergence and convergence are well represented in the process. This methodology helped structure the project effectively.

Personally, the research phase might have been too extensive, producing a lot of specific results that may not have been entirely necessary from the company’s perspective. Therefore also creating too many insights which made the process more difficult. If the discovery phase would have been slightly less specific, other potential directions could have been explored earlier, possibly leading to alternative, and more successful, outcomes. That said, a broader approach would have been riskier, as more focused research often produces yields results with greater impact.

In future projects, I would aim to create a better balance between research and iteration and ensuring a better synergy between these phases. I would have preferred to spend more time on design iteration and concept refinement, where there would have been room for implementation strategies, branding, and marketing, which could have enhanced the final output.

Another point I want to improve on in future projects is to have more consistent validation points throughout the process starting at an earlier stage. Given that this was an individual project, and part of it took place during the summer, validation was more difficult to achieve. However, by regularly testing desirability, feasibility, and viability along the way, I would have been able to reflect and make course corrections more effectively. This remains a key takeaway for future projects.

12.4.2 Personal

At the beginning of my thesis, I set several personal learning objectives. These goals allow me to reflect on my growth and development throughout the project.

Stakeholder Management:

I have grown more confident in presenting my work and recognizing my value within the project. However, I still see room for improvement in actively involving others in the project. At times, I hesitated to engage stakeholders, either because I did not want to take up too much of their time or because I was not yet confident in my work and wasn’t ready to receive feedback. This sometimes resulted in a more individualistic approach, where I didn’t take full advantage of others’ perspectives. Although I am aware of

the value multiple viewpoints bring to a project, I realize I could have been more open to this earlier on.

Besides this, being in charge of creating my own workflow forced me to structure and plan everything independently, which I found both enjoyable and essential. Working in an organized and goal-oriented manner helped me stay on track, and I believe this project reflects my strength in organizing and setting clear objectives.

Identity as a Designer:

This project has enhanced my understanding of my strengths and the aspects of the design process that I find most enjoyable. I have discovered that I excel in the parts of insights gathering, transforming observations and interview insights into problem statements, and developing tangible solutions through strategic thinking. I particularly enjoy creating visions and turning them into visual concepts, where all elements integrate seamlessly. Working at this higher, visionary level gives me more satisfaction than delving into the details of execution on a business level.

One of my biggest challenges during the project was conducting academic research and writing. Initially, I struggled with this, partly due to my lack of experience, which made me hesitant. But eventually, I learned a lot from this. I realized that I need to trust myself more, especially in areas where I feel less confident. Instead of seeing challenges as weaknesses that could do more harm than good, I need to start learning to view them as opportunities for growth.

Although this was an individual project, I strongly believe in the power of teamwork and co-creation. I find that working on projects like these in teams produces better results. The knowledge I gained during this project, both professionally and personally, has made me a strong team player, as I understand my own strengths and when I need to rely on others to fill gaps.

Academic Understanding of Product-Service Systems and Consumer Behaviour:

This thesis largely focussed on gaining academic knowledge about product-service systems and consumer adoption behaviour. I have deepened my understanding of these areas, and I recognize the relevance of having this knowledge as a (strategic) designer. Knowing now how these two topics are relevant in designing concepts, I find that I am more drawn to improving consumer experiences rather than using this knowledge to increase profitability for companies. The focus on the human side of design aligns more with my personal interests as a designer.

Real-Life Experience:

I am grateful for the opportunity to work with elho during

this thesis. Being part of the design and innovation team gave me a clear understanding of how product development works within a design and manufacturing company. Seeing the value of each team member’s contributions provided valuable insight into how the skills I’ve learned during my studies translate into a professional setting. This experience also gave me a broader perspective on how my role as a strategic designer fits into a larger organization.

Visual Communication, writing and storytelling:

Throughout the thesis, I made an effort to work visually, to enhance the understandability of the project and ensure that it remained clear and easy to follow. Creating visual representations of my process in Miro along the way helped me stay organised and communicate ideas more effectively. Additionally, the concept development phase was relatively short, and I had hoped to acquire new skills during this part of the process. A big part of the thesis centred around writing, an area in which I do not usually excel; however, this challenge ultimately allowed me to enhance my writing skills. Despite these limitations, I believe I have further developed my ability to use visual communication as a valuable skill for projects, and this remains an area that I find enjoyable and rewarding.



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Most of the images used are provided by elho Group or taken by me, unless otherwise stated.

All illustrations and visualisations are created by me unless indicated otherwise. Adobe Firefly has been used primarily to generate images for the customer journey and the chapter titled 'Presenting the Concept'. ChatGPT-4 was employed to assist in rewriting my text to enhance fluency and to check for grammar and sentence structure throughout this thesis.

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Images

In order of appearance

8 No-Nonsense indoor gardening tips you can’t ignore. (2019, May 6). Click & Grow EU. <https://eu.clickandgrow.com/blogs/news/8-no-nonsense-indoor-gardening-tips-you-can-t-ignore>

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APPENDIX

The appendices are not included in this Master’s thesis because they contain confidential information, except for the project brief, which is a mandatory submission.

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IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student’s IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project’s setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student’s registration and study progress
- IDE’s Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name

Initials

Given name

Student number

IDE master(s)

IPD

Dfi

SPD

2nd non-IDE master

Individual programme (date of approval)

Medisign

HPM

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair

mentor

2nd mentor

client:

city:

optional comments

dept./section

dept./section

country:

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

! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.

! 2nd mentor only applies when a client is involved.

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)

Shahrokh Nikou

Digitally signed by Shahrokh Nikou
Date: 2024.04.02 08:38:57 +02'00'

Name

Date

Signature

CHECK ON STUDY PROGRESS

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

Master electives no. of EC accumulated in total

EC

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

EC

★	YES	all 1 st year master courses passed
	NO	missing 1 st year courses

Comments:

Sign for approval (SSC E&SA)

Robin den Braber

Digitaal ondertekend door Robin den Braber
Datum: 2024.04.11 08:28:00 +02'00'

Name

Date

Signature

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE’s Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	★	Supervisory Team approved
NO		Supervisory Team not approved

Comments:

Based on study progress, students is ...

★	ALLOWED to start the graduation project
	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Monique von Morgen

Digitally signed by Monique von Morgen
Date: 2024.04.11 09:25:09 +02'00'

Name

Date

Signature

154 | Master thesis

Master thesis | 155

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Personal Project Brief – IDE Master Graduation Project

Name student

Teun van Wakeren

Student number

4,669,487

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title

Growing beyond product: Designing a service-centric business model for an indoor gardening product

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

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Elho Group is seeking new product opportunities in its mission to bring people and nature closer together. Therefore, they want to explore possibilities through product-service systems (PSS) to offer the consumer a more diverse range of products which can lead to gaining brand awareness (Razak, 2022), targeting new consumers, improving product sales (Elezaj et al., 2023), and gaining competitive advantage (Durugbo, 2013) within the indoor gardening industry.

They have experience rapid growth within their 'Grow your own' product category, therefore targeting this area as an entry point for a PSS. The core of this new PSS will be created around an indoor gardening product that encourages today's environmentally concious consumer to produce edible plant, microgreens, and herbs indoors.

The goal for Elho to be attuned with its future customers for this new product. Because of this, they are seeking an opportunity to include a service model next to this product should enhance consumer awareness, stimulate product use, and contribute to Elho's purpose: 'Together we give room to nature'.

They are new to the PSS industry and lack experience in service design and subscription models, posing a challenge. They're unsure how to best reach a new target audience, create a unique value proposition and are looking for an onboarding strategy for this PSS, including finding partners to develop a functional business model.

Stakeholders in this project include: Elho group, Partners to be discovered, the end customer of the PSS

The primary opportunity is to determine the most feasible, viable, and desirable way of introducing a new PSS business model centered around an indoor gardening product into a purpose driven company that currently solely produces physical goods.

Rather than desining the physical product itself, my primary focus for this project will be on consumer acceptance and adoption of new PSS and how understanding the future context of indoor gardening. I strive to create a context that meets Elho's objective in exploring a new business opportunity, allowing for an accessible integration of this PSS in the future.

In this graduation project, academic research and design methods will be combined to identify new business opportunities and propositions within the indoor gardening industry, design a service that is in line with Elho's vision for the product, and develop an onboarding strategy. More details can be found in Figure 1 about the project approach.

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introduction (continued): space for images

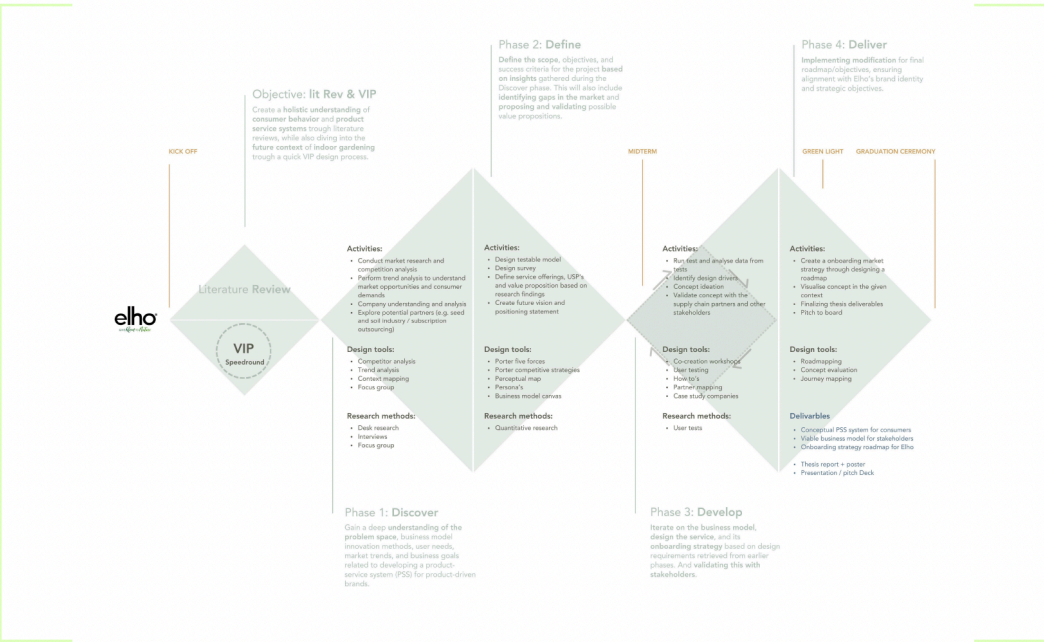


image / figure 1 Project approach based on the double diamond method

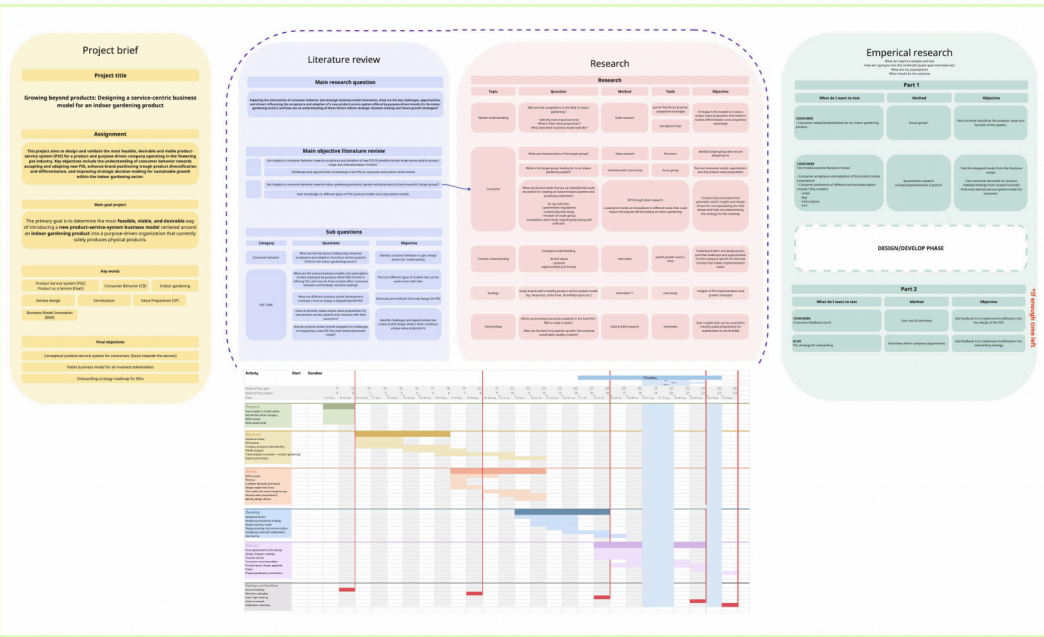


image / figure 2 Project brief + research plan

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Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)

Elho is seeking to explore service opportunities within a new product category 'indoor gardening'. This means being attuned with future consumers, finding the right service model, establish the right partnerships, designing an appealing service model, investigating and creating the best strategy for onboarding, and developing a viable business plan with distinctive value propositions for all stakeholders involved (Rozenfeld & Cencic, 2018). Thorough research and strategic design are needed to manage this shift successfully.

The main research goal is to identify and implemenet the most effective approach for Elho to introduce a new PSS for their brand. Thereby creating the opportunity to:

Enhance consumer experience: By introducing a PSS, Elho can offer consumers a more holistic and engaging experience beyond just physical products which stimulate long-term customer relationship which could be beneficial for a lifestyle brand (Hajjheydari et al., 2022).

Establish partnership: By integrating stakeholders into the service ecosystem, elho can ensure a seamless and sustainable supply chain while providing additional revenue streams that are beneficial for partnerships (Hajjheydari et al., 2022).

Expand and differentiate Elho's brand: Developing this PSS helps to expand Elho's product range within their industry distinguishing them from competitors (Hajjheydari et al., 2022). This can attract new customers who prioritize brands that align with their values (Chen, 2018), thereby expanding Elho's customer base and market share.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence)
As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

This project aims to design and validate the most feasible, desirable and viable product-service system (PSS) for a product and purpose driven compamy operating in the flowering pot industry. Key objective includes the understanding of consumer behavior towards accepting and adopting a new PSS, enhance brand positioning through product diversification and differentiation, and improve strategic decision-making for sustainable growth within the indoor gardening sector.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

A more elaborate research and project planning can be found in Fig 2: project planning.

Main RQ:
Exploring the intersection of consumer behavior and strategic business model innovation, what are the key challenges, opportunities, and drivers influencing the acceptance and adoption of a new product-service system offered by purpose-driven brands (in the indoor gardening sector), and how can an understanding of these factors inform strategic decision-making and future growth strategies?

For this project approach, I will be working mostly with the double-diamond method which allows me to use divergent and convergent thinking to explore ideas and refine solutions. This methos is well-suited for this project as it provides a structured framework for iterative exploration and refinement while keeping a holistic perspective (Binder, 2023) on all the different aspects that emerge when designing a service/business model. It enables iterative design processes, ensuring alignment with stakeholder needs and project objectives while fostering creativity and innovation (Binder, 2023).

I will conduct a literature review to learn more about consumer behavior towards product-service systems for product driven brands. From that creating a testable model in order to design the best service for the target audience. Next to this I will do a shortened VIP design round to dissect and understand the context of indoor gardening and its future potential to gain design drivers for the concept phase.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting, mid-term evaluation meeting, green light meeting** and **graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting

22 mrt 2024

Mid-term evaluation

22 mei 2024

Green light meeting

19 juli 2024

Graduation ceremony

4 sept 2024

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	
For how many project weeks	
Number of project days per week	

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

Taking on this project is an exciting step towards merging my academic interests with my personal passions and future career goals. Exploring the development of product-service systems in the lifestyle product industry is the perfect fit for me, as it allows me to expand my knowledge in sustainable business development and service design. The company's commitment to sustainability and nature aligns perfectly with my values, creating an environment where I feel right at home. Additionally, this project offers a chance to gain hands-on experience and insights into real-world project management and stakeholder engagement, which are essential skills for designers when working on bigger projects. I'm eager to further develop my professional skill set and prepare myself for life after graduation.

Specific learning objectives:

- Learn how to take the lead in stakeholder management to ensure that every stakeholder is involved and up to date during the project. Therefore, expectation setting, clear and supported communication, and planning will be needed to create a professional, transparent, and respected workflow.
- Figuring out who I want to be as a designer, and where my passion in strategic design lies.
- Understand and acknowledge where my strengths and weaknesses lie within executing client projects and turning insecurities into opportunities to learn how to deal with those.
- Gaining more academic understanding of product-service systems and consumer behavior towards this topic, as well as determining whether these subjects interest me.
- Gain real-life experience within an organization and understand the value/essence of my role as strategic designers.
- Use and improve my visual skills in storytelling, report writing, information communication and concept creation.