Towards a plant-based plate of the future

Designing an Intervention to Stimulate Young Adults in creating Plant-Based Recipes within the Supermarket Context

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Preface

Dear reader,

This design project is the final step in my master's degree in Integrated Product Design at the Technical University of Delft. It began in late February 2024 and spanned six months.

Throughout this period, I began viewing the world through a food lens, recognising how it shapes our lives on various levels, from our individual bodies to cultural societies and the sustainability of our entire planet. All aspects are connected to the plate in front of us. During my master's studies, I discovered that design plays a central role in shaping interactions between humans and food. This thesis aims to explore how design can foster a more sustainable food system by changing dietary behaviour. This opportunity provided by Flevo Campus has allowed me to immerse myself in the complex world of food and behaviour change.

In my social surroundings, I observe a willingness to contribute to a better world through more sustainable food consumption. However, changing dietary habits is challenging. But why exactly is this the case? And how can design inspire, stimulate and guide people towards sustainable decision making? This thesis aims to understand the barriers young adults face with plant-based meals and explore how design can address these challenges.

Various individuals and parties have been essential in bringing this project to life. I would like to thank everyone who has been involved.

First and foremost, I want to thank my supervisors. JanWillem, thank you for maintaining the overview of this design project. Your questions guided (and nudged) me into the right directions and ensured me I did not overlook important elements during fuzzy moments. You taught me that haste does not benefit the design process. Rick, I appreciate the knowledge you shared on food design and the inspirational insights you provided on bean-related designs. You made sure the important ingredient named fun was incorporated to the recipe of this thesis.

Thank you, Guus, for your positive and inspirational supervision throughout this project. You consistently reminded me to focus on narrowing down the project and address the core problem to design a fitting solution. You opened my eyes, understanding the value of a designer in the design practice and opened the door in Flevo Campus to continue the development of the design intervention.

I also want to thank the others of the energetic and knowledgeable team at Flevo Campus. Through many conversations, I learned a lot about the complex world of food and received valuable feedback during the design process. Special thanks to Mette, my partner in crime throughout this project. Our research projects at Flevo Campus were similar and we discovered how we could combine our forces. Your expertise in climate-related psychology and behaviour have been essential in designing this intervention. I am looking forward to developing the intervention together. Thank you, Thera, for organising the connection with Albert Heijn BUN. You taught me a great deal about managing stakeholders and integrating their perspectives into the concept.

Thank you, BUN, for your interest in this design research and for providing the testing opportunity. Thank you, Niels, the Albert Heijn manager of Almere Columbuskwartier, for facilitating the testing location, including providing an Albert Heijn T-shirt and (ironically) placing us next to the discounted meat section.

I want to thank my family and friends for their support and for showing up to the 'beers, beans, and basketball' design sessions. Luckily for me, many of you fit the profile of the target audience. Your insights fueled this project and were essential to its development.

Enjoy reading!

Vera Stoop

Ps. Are looking for some inspiration for dinner tonight? Scan the QR code on page 9.

Glossary

Food

- **Animal protein** refers to proteins derived from sources such as meat, poultry, fish, eggs, and dairy products. These proteins are considered complete because they contain all the essential amino acids required for proper functioning and growth in the human body (Plant Vs. Animal Protein: The Differences | Redefine Meat, 2022).
- **Plant-based protein** comes from sources like legumes, grains, nuts, seeds, and certain vegetables. Unlike animal proteins, plant-based proteins may not contain all essential amino acids in a single source. However, by combining different plant-based protein sources in a balanced diet, individuals can obtain all essential amino acids (Plant Vs. Animal Protein: The Differences | Redefine Meat, 2022).
- A **plant-based meal** primarily consists of foods derived from plants, including vegetables, fruits, grains, nuts, seeds, and legumes, and excludes animal products such as meat, dairy, and eggs.

Diets

This thesis examines different diets based on the quantity and type of animal-based products they include. While people may interpret these diets differently, this report uses the definitions provided by Statistics Netherlands (Van Beuningen, 2021).

- A **vegetarian diet** is a primarily plant-based diet, exclusing meat and fish. This diet occasionally consumes animal derived products like dairy and eggs, gelatin and honey.
- A v**egan diet** is a strictly plant-based diet, excluding all animal products.
- A f**lexitarian diet** is a primarily plant-based diet with limited or occasional inclusion of meat or fish. This approach allows for flexibility, moderation and personal interpetation of the strategy. For instance, some flexitarians choose to eat meat only on weekends, while others replace their yogurt with a plant-based alternative.

General

- An **intervention** is an action or strategy implemented to bring a positive change, address a problem, or improve a situation. There are roughly four different types of behavioural interventions, involving informing, persuading, and training and nudging.
- **Biospheric values** are principles that prioritise the well-being of the environment and all living organisms, emphasizing the importance of ecological balance and sustainability.
- A **recipe library** refers to the collection of recipes that a consumer knows by heart and prepares frequently.
- **Foodmood** is a term used to describe the specific type of food or cuisine that someone is in the mood for at a given moment. It reflects the cravings or preferences for certain flavours, textures, or types of meals, such as craving comfort food, a specific cuisine like Italian or Indian, or a particular dish like a salad or a curry. This mood can influence the choices a person makes when planning a meal or deciding what to eat.

Executive summary

Our current food system causes numerous problems beyond our plates, placing pressure on our planet. The most efficient way to reduce the pressure of our food consumption on the planet is by consuming fewer animal proteins and more plant-based proteins (United Nations, z.d.) This transition known as the protein transition requires widespread behavioural changes among consumers.

Flevo Campus, a knowledge institute focused on urban food issues, is involved in this transition. At the start of 2024, they published a whitepaper on the potential of beans in this shift. Beans have sparked this thesis and moved the design context into the supermarket. Initially centered on incorporating beans into evening meals, the scope expanded to creating in-store plant-based meal options. This change was prompted by consumer feedback indicating a desire for a diverse range of plant-based proteins in their recipes instead of focussing on beans.

Supermarkets play a crucial role in shaping dietary habits, with nearly 70% of all food consumed in the Netherlands being purchased in-store. This creates an design opportunity to influence people's eating habits. Young adults, who known to be more open to dietary changes, often shop for their evening meal after a busy day at work and enter supermarkets without a grocery list. In these situations, they are most influenced by their surroundings when making decisions, and their biospheric values are often overshadowed by the desire for convenience.

The ultimate goal of this project is to design an intervention that causes dietary behaviour change and accelerates the protein transition through the design statement:

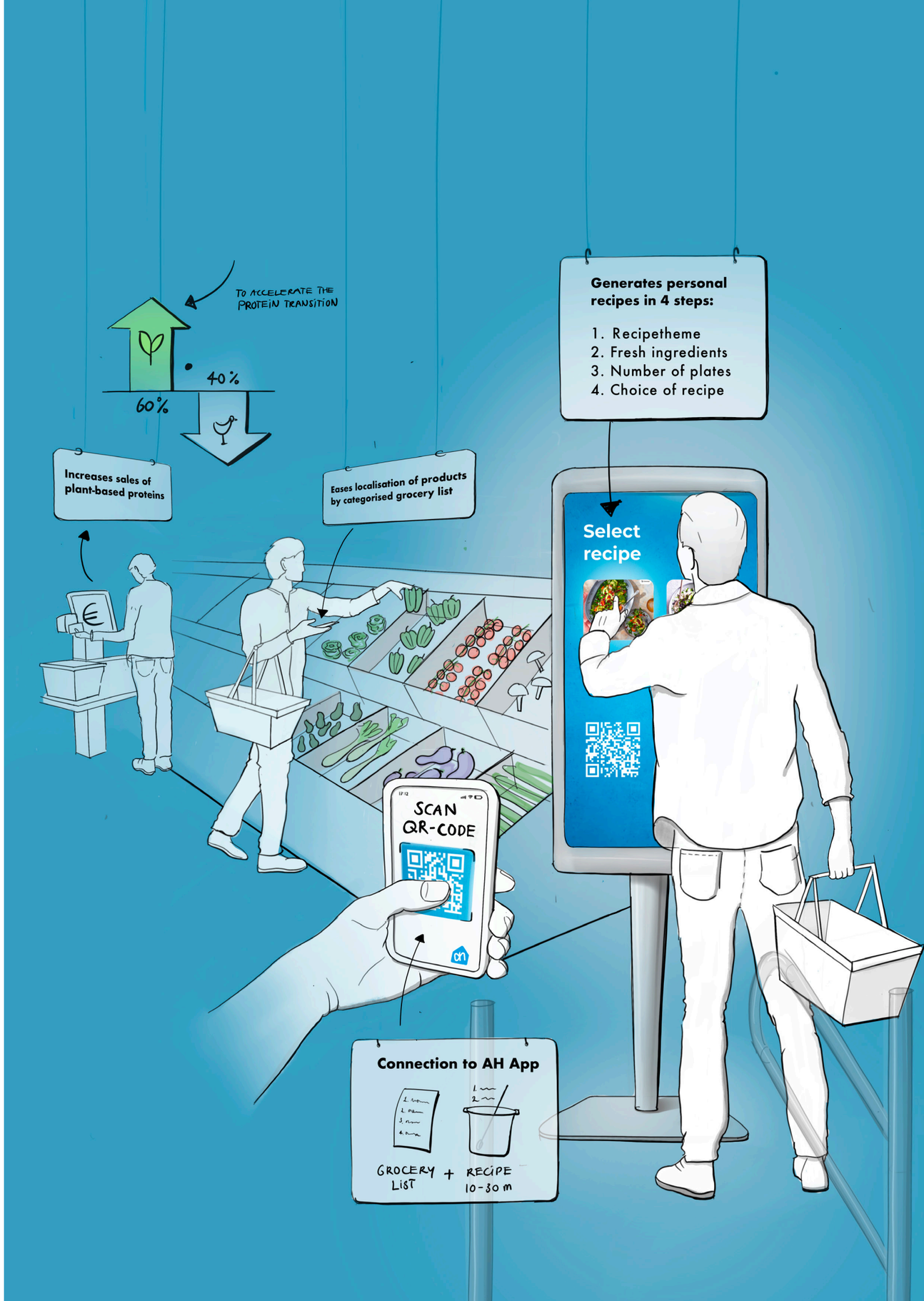
"To stimulate young adults to choose plant-based meals, we want them to feel eased and inspired by providing convenient and appealing recipe suggestions that make plant-based choices effortless and enjoyable."

To develop an effective design intervention, the project began with research into the protein transition, behaviour change theories for young adults and the influence of the supermarket contexts on decision making. Insights from literature and field research were used to create a storyboard and persona, addressing the core dilemma of "What's for dinner tonight?" when entering the supermarket. This is precisely that moment the protein screen intervenes.

The Protein Screen is a Product-Service System with an interactive screen placed just beyond the gates of the supermarket. The visitor is presented with three questions, which they could answer by tapping on the screen. Based on their responses, the visitor receives plant-based recipes recommendations and finds a recipe match. By scanning QR code, the user recieves the grocery list and recipe on their phone. In just one minute, users can start filling their shopping carts with ingredients for a delicious an nutritious plant-based meal, tailored to their food preferences. This system enhances plant-based product sales, aligning with the supermarket's sustainability goals.

The concept was tested with a Minimum Viable Product (MVP) in a supermarket, yielding feedback from the target audience and stakeholders. Consumers found the interactive screen helpful and enjoyed the user experience. Flevo Campus responded positively and expressed interest in further development. Additional steps in collaboration with other stakeholders need to be taken regarding the (financial) feasibility of the project.

This project includes a detailed case study demonstrating how behaviour change theory can be effectively applied to an design intervention in a supermarket setting. The case study presents a Product-Service System designed to guide consumer choices toward plant-based options. Additionally, the project offers recommendations for future development in this area.



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A
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Introduction

This section introduces the design project. The first chapter highlights the relevance of the graduation project by describing the animal protein dominant regime of the Dutch foodlandscape and its destructive effects on people and the planet. Following that, the chapter delves into the project background, discussing the phenomenon of the transitions, situating the protein transition within a wider framework. Finally, the product assignment is introduced. The second chapter provides an overview of applied research and design methods.

01 chapter | Background

Providing enough healthy food for yourself and your loved ones is one of the oldest concerns in history. In recent years, the concern for the planet has been added. Producing food for 10 billion people by 2050 puts great pressure on nature, the landscape, the climate, and the environment. The most efficient way to reduce the pressure of our food consumption on the planet is by consuming fewer animal proteins and more plant based proteins (United Nations, z.d.). This shift is named the protein transition.

To understand the importance of this shift, the first paragraph explains how animal-based proteins became dominant in the Dutch food landscape and the second discusses the negative impacts of this widespread consumption on both people and the planet. The third paragraph provides a broader context for understanding the protein transition. The final part delves into the background of the project at Flevo Campus and outlines the project's assignment.

1-1 Dutch foodlandscape

In the Dutch diet, the majority of proteins (57%) come from animal-based food products. The Dutch Centre for Intangible Cultural Heritage lists 34 Dutch food traditions, and 25 of these recipes involve products such as milk, eggs, meat, and cheese (Kenniscentrum Immaterieel Erfgoed Nederland, 2024).

Livestock industry

This animal protein based food landscape on the Dutch plate is influenced by the livestock industry and government policy. After the hungry years of the Second World War, securing food supply was of great importance in strategies of the Dutch government. Big investments in the farming industry caused an expansion of the scale of animal livestock farming in the Netherlands. The facts below illustrate the growth of the intensity of livestock between approximately 1945 and 2016 (Centraal Bureau voor de Statistiek, 2017).

Pigs

The number of pigs increased from 1.9 million in 1950 to 12.4 million in 2016.

Hens

In 1956, the 33.0 million laying hens in the Netherlands laid 224 million kg of eggs. In 2012, there were nearly 42.8 million laying hens that laid 672 million kg of eggs.

Cows

In 1950, an average dairy cow produced 4 thousand liters of milk per year. By 2015, this has doubled to 8.2 thousand liters.

Due to increased production scale, these products have become cheaper, and economic growth has given Dutch citizens more disposable income to spend on animal-based products. History has shown that when people can afford meat, they tend to prefer it over plant-based protein sources such as beans (Broekaert, 2023).

AVG

One of those typical Dutch recipes is referred to as AVG, an abbreviation for 'potatoes, vegetables, meat' (Dutch translation: aardappelen, groenten, vlees). This traditional Dutch meal structure includes three main components as depicted below.

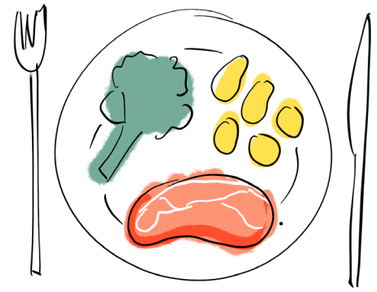


Figure 2: Typical AVG plate

- **Protein source** - usually meat
- **Carbohydrates** - often potatoes
- **Vegetables** - for instance broccoli, cauliflower or carrots

Evening meals

The traditional AVG Dutch meal structure shapes our dietary habits, leading to high animal protein consumption, particularly at dinner. Research shows that the majority of animal proteins are consumed at this time, with 75% of main Dutch meals featuring fish or meat (Centraal Bureau voor de Statistiek, 2024). This highlights dinner as an opportunity to make an impact by shifting towards more plant-based meals. (Eiwitmonitor: Vlees en Zuivel Nog Steeds Favoriet, Overgang Naar Plantaardig Gaat Niet Snel Genoeg, n.d.).

Food regime

The growth of the livestock industry and its influence on the AVG meal illustrate how the Dutch food landscape became dominated by animal protein. The country's food regime is defined by its large-scale livestock industry, which produces a high volume of animal protein products such as milk, cheese, meat, and eggs (Loorbach, 2014).

1-2 Problems beyond our plate

Why change the habit eating plate with AVG? The current food system is exceeding planetary boundaries and the high consumption of animal based proteins play a dominant role in this. Due to population growth, urbanisation and the increase of wealth, the demand for animal-based food is quickly rising (Hollander et al., 2017). This paragraph links four major global problems to a high consumption of animal based products; environmental impact, health, fair agricultural economy. animal welfare.

To feed a growing population while staying within planetary boundaries, a plant-based diet would be more efficient. Producing animal protein requires many kilograms of plant protein, which could otherwise be consumed directly by humans. As a result, plant-based proteins generally produce 10 to 50 times fewer emissions compared to animal-based proteins (Ritchie, 2020). This thesis focuses on the low environmental impact of plant-based meals.

Environmental impact

The production of animal-based food products is inefficient due to their high consumption of energy, water, and land. The major environmental impacts of animal-based proteins are listed below.

- Food production contributes to 25-30% of total greenhouse gas emissions (Poore & Nemecek, 2018). **The livestock industry accounts for 14.0% to 17.3% of global emissions** (The Breakthrough Institute, 2023).
- Agriculture occupies half of the habitable surface of the planet (Ellis et al., 2010). **Three-quarters of global agricultural land is used for livestock** (Ritchie & Roser, 2024). However, it provides only 18% of calories consumed by humans worldwide.
- Approximately 70% of accessible freshwater is used in agriculture. **41% of total agricultural water is used for the production of livestock feed** (Heinke et al., 2020).
- **Livestock accounts for 94% of the nonhuman mammal biomass** (Ritchie et al., 2022).

Health

Research indicates that overconsumption of specific animal-based protein sources is linked to health risks, including an elevated likelihood of chronic diseases (Health Council of the Netherlands, 2023). Excessive intake of animal proteins is associated with an increased risk of cardiovascular diseases (Bailey, 2024). Moreover, large-scale factory farming worsens public health concerns by fostering the transmission of zoonotic diseases (Ouwehand, 2021).

Fair agricultural economy

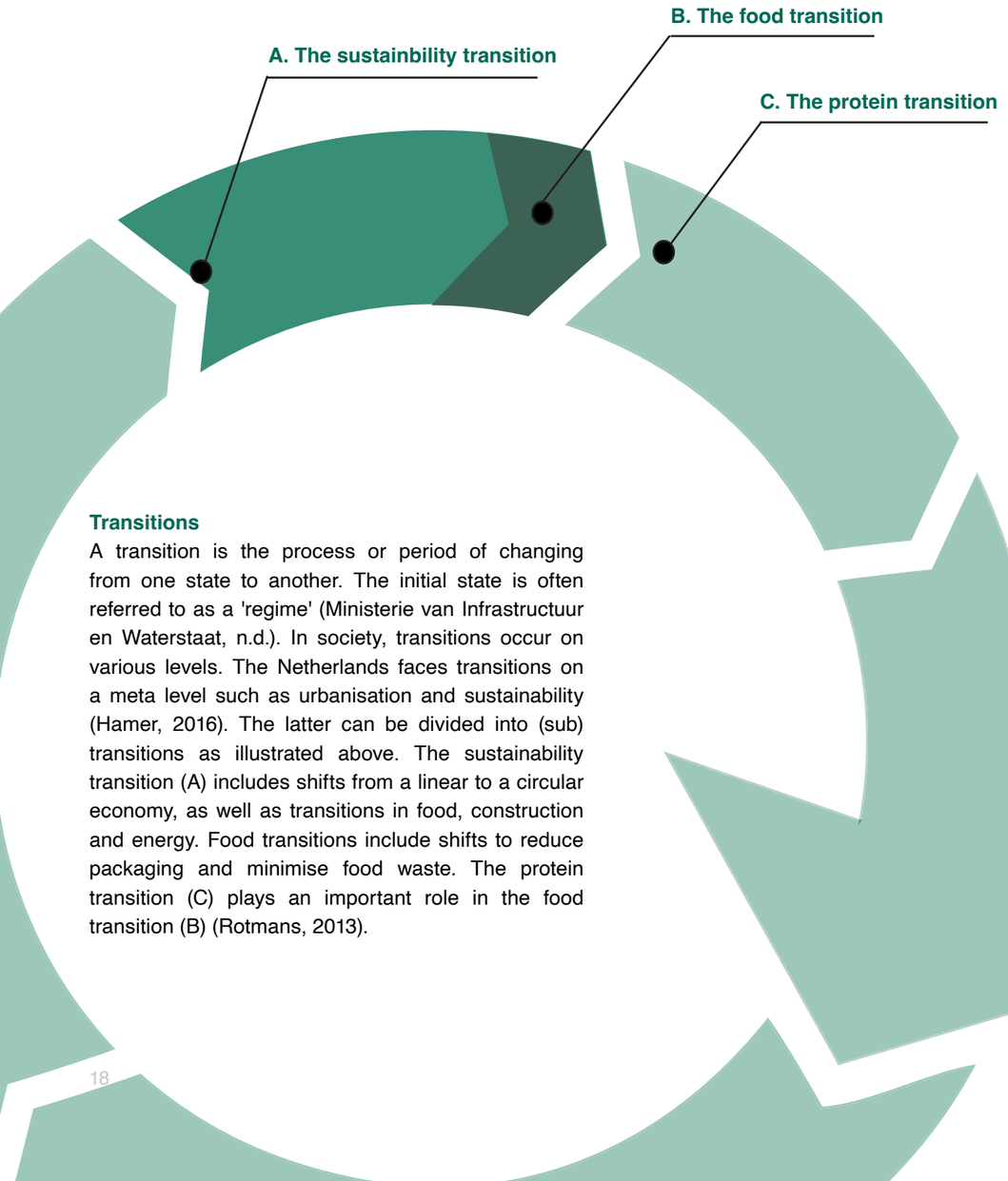
Animal agriculture perpetuates economic inequality in several ways. Dominated by a few large corporations, it forces small farmers to accept low prices, driving them out of the market (Weinrich, 2018). Government subsidies favouring large corporations over small farms exacerbate this disparity (Dier & Recht, 2021). Moreover, marginalised communities suffer disproportionately from the negative impacts of animal agriculture, deepening societal inequalities (EPA, 2021).

Animal welfare

Animal welfare is a concern in the production of animals for human consumption. Livestock animals often endure cramped conditions, limited access to the outdoors, and are deprived of natural behaviours (European Union, 2020). Ethical debates on this issue are complex and subjective, but many argue that intensive animal agriculture, like factory farming, is unethical because it causes suffering and denies animals their rights (Alvaro, 2017).

1-3 The protein transition

Proteins are essential in a healthy diet and animal proteins are an excellent source due to their amino acid composition. However, considering the consequences pointed out in the previous chapter, we should source our proteins in plants. This requires a protein transition. But what is the protein transition and how does this food transition relate to other societal transitions? This paragraph starts with an examination of transitions, situating the protein transition within this wider framework. Followed by an analysis of the current status of the protein transition.



Transitions

A transition is the process or period of changing from one state to another. The initial state is often referred to as a 'regime' (Ministerie van Infrastructuur en Waterstaat, n.d.). In society, transitions occur on various levels. The Netherlands faces transitions on a meta level such as urbanisation and sustainability (Hamer, 2016). The latter can be divided into (sub) transitions as illustrated above. The sustainability transition (A) includes shifts from a linear to a circular economy, as well as transitions in food, construction and energy. Food transitions include shifts to reduce packaging and minimise food waste. The protein transition (C) plays an important role in the food transition (B) (Rotmans, 2013).

The protein transition

As explained in Chapter 1-1, the Dutch diet is renowned for its high consumption of animal proteins. Animal proteins constitute an average of 57% of human protein intake, with plant-based sources making up the remaining 43% (RIVM, 2021). To align with planetary boundaries, the EAT-Lancet Commission advocates for a shift towards diets rich in plant-based proteins and reduced animal protein intake, known as the protein transition. The Dutch government has embraced this recommendation, setting targets: by 2030, they aim for 50% of the average Dutch protein consumption to be sourced from plants, with a long-term goal of achieving a ratio of 60% plant-based proteins to 40% animal proteins by 2050 (Rijksoverheid, 2018).

To facilitate this transition, the current food regime, which is centered around animal proteins, must be transformed to prioritise plant-based proteins (Loorbach, 2014). Recently, several interventions have been introduced to accelerate this protein transition, including plant-based meat substitutes, and the national “week without meat” initiative.

Transition charactersitics

Despite their diversity, transitions share common characteristics. Those are outlined below and linked to the protein transition.

1. A transition involves of building up and scaling down, referred to as the X-curve as depicted in see Figure 2.

- *The protein transition builds up plant-based proteins and scales down animal proteins (De Balie, 2023).*

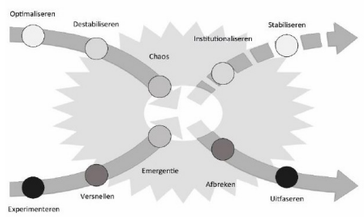
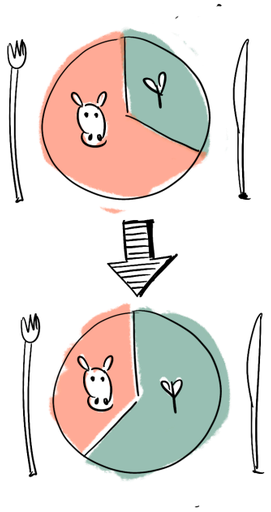


Figure 2: X-curve of transitions (Programma naar een Rijke Waddenzee, 2020)



2. Transitions affect all citizens sooner or later because they influence daily life (Ministerie van Infrastructuur en Waterstaat, n.d.).

- *The protein transition alters dietary choices, availability of food options, and impacts social and cultural norms surrounding food consumption.*

3. A transition often faces four main phases: pre-development, tipping point, acceleration, and stabilisation as plotted in Figure 3.

- *The protein transition is currently in the early stage of phase 2.*

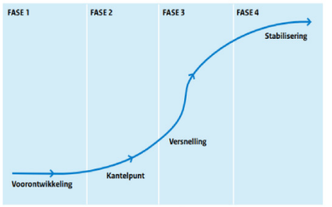


Figure 3: four transition stages

4. Various societal organisations are involved in transitions, including citizens, businesses and government (Ministerie van Infrastructuur en Waterstaat, z.d.).

- *The protein transition has many stakeholders due to multifaceted food systems.*

Reaching the social tipping point

The protein transition represents a significant societal shift that requires encouraging behavioural changes among citizens. Transition expert Reint Jan Renes suggests that such transitions reach a ‘social tipping point’ when 20 to 25% of the population adopts a plant-based diet, at which point the transition is expected to accelerate rapidly (De Balie, 2023). In 2020, 5% of the Dutch population followed a diet low in animal protein, including 3% pescatarians, 2% vegetarians, and 0.4% vegans (Van Beuningen, 2021). These demographics cover the innovators and part of the early adopters on Rogers’ innovation curve (see Figure 4). However, research indicates that the adoption of these protein poor diets has stabilsed (Interview: Nederlandse Vegetariërsbond, 2023). A contributing factor to this stabilisation is the segregation of these groups, often perceived as distinct subcultures, which limits broader societal adoption (Dijkstra, 2023).

Figure 4: Roger innovation curve

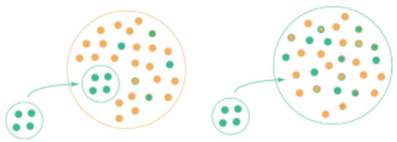


Figure 5: Left: ‘ separation’, right: ‘integration’ (Dijkstra, 2023)

Targeting young adults

Measuring the protein transition solely through dietary categories is inadequate. Many people contribute by reducing the frequency and portion sizes of animal-based protein, a group known as flexitarians. This thesis targets young adults aged 18-34, the most open to dietary changes and adopting a flexitarian diet. In the Netherlands, this group includes approximately 4.7 million individuals. Young adults who adopt a flexitarian diet can strongly influence their social environment to reduce animal product consumption, promoting the integration of plant-based choices (see Figure 5). This social influence can accelerate the protein transition and contribute to reaching the social tipping point (Dijkstra, 2023).

1-4 Assignment

Flevo Campus

One of the stakeholders currently working within the field of the protein transition is Flevo Campus, an innovation and research centre in the Netherlands focused on sustainable food systems. In February 2024, Flevo Campus published a whitepaper titled “De Bonenrevolutie” (The Beans Revolution). This research highlights the potential of beans in the protein transition. Beans, being high in protein, can effectively replace animal proteins. They also offer additional benefits, such as enriching soil by binding nitrogen and providing health advantages. Given these benefits, why do the Dutch consume so few beans, and who should take action to change this?

Supermarket

The whitepapers suggest that the solution involves themes such as routine, perception, behaviour, convenience, and flavour. Beans are currently perceived as mushy, tasteless, and inconvenient, often relegated to the less-visited canned goods section of supermarkets. Since Dutch consumers buy about 70% of their groceries from supermarkets (Flevo Campus, n.d.), these stores are crucial in decision-making. Flevo Campus aims to enhance the appeal of beans through this channel, because while other sections of the supermarket evolve, the canned goods aisle remains stagnant. The aisle primarily appeals to older generations and fail to engage younger customers (Lanjouw et al., 2024).

Figure 6: Whitepaper ‘De bonenrevolutie’

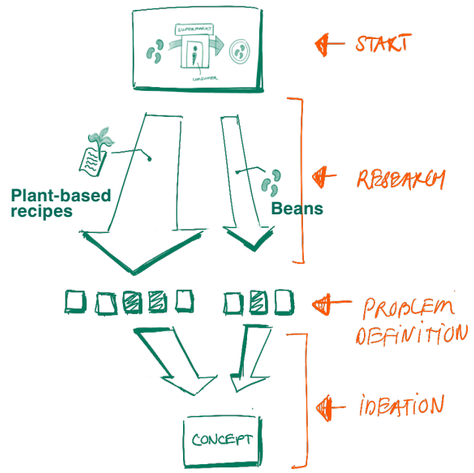
Research assignment

Following the whitepaper, Flevo Campus initially explored ways to enhance the appeal of beans through the supermarket context. The following research question was formulated in collaboration with Flevo Campus:

How can the supermarkets stimulate the incoperation of beans in the Dutch diet as a sustainable protein source?

Throughout the design process, the focus shifted from beans to a broader range of plant-based recipes including beans. The illustration below shows how the role of beans changed throughout this process. By the end of the design process, consumer research revealed that the concept centered around bean recipes did not meet the target audience’s needs, relegating beans to a secondary role in this research. As a result, beans were excluded from the research question, which was revised to:

How can the supermarket inspire, guide and stimulate young adults in composing plant-based meal recipes?



Conclusions Chapter 1

The Dutch food landscape, rooted food traditions like the “AVG” meal structure, centers around animal proteins. Animal proteins harm both people and planet. To drive a societal shift from animal proteins to plant-based proteins, it is essential to encourage behaviour change among citizens, particularly targeting young adults. This demographic is open to dietary changes and can help integrate flexitarian habits into society. Supermarkets play a crucial role in influencing their dietary choices, as many food-related decisions are made there. Consequently, supermarkets provide a unique opportunity to challenge established food routines and encourage young adults to create and embrace plant-based meal recipes.

02 chapter | Approach

In this chapter, the assignment is delineated through a defined scope. Following this, the design approach will be elaborated, introducing the concepts of transition design, Human-Centered Designand the Double Diamond framework. The double diamond framework provides an overview of the research and design methods employed. Subsequently, the stakeholders of the project are introduced. The chapter concludes with a vision statement.

2-1 Project scope

Young adults
Focusing on young adults aged 18-34 is crucial because they are the most open dietary changing and to adopt a flexitarian diet.

Supermarkt in-store context
This thesis focuses on physical supermarkets, where Dutch individuals acquire about 70% of their groceries (Flevo Campus, n.d.), spending an average of 45 minutes weekly navigating these spaces and making many impactful food related decisions. Research has shown it easier to chose animal-based protein in the supermarket context (Locatus, 2020).

Sustainability driver
Considering key factors driving the protein transition, such as health, animal welfare, and fair agricultural practices, this project emphasises minimising environmental impact as the primary driver. For the target audience of young adults, this is an important reason to eat more plant-based food.

Albert Heijn
The Netherlands has a diverse range of supermarkets, each with unique branding, offerings, target demographics, and store locations. This design project focuses on Albert Heijn because it is the most popular supermarket among the target audience and has the largest market share, ensuring the greatest impact. Additionally, as a key stakeholder in the protein transition, Albert Heijn is committed to developing interventions to achieve its sustainability goals.

Plant based recipes
The focus is on the 'building up' characterstic of the transition, emphasising the increase in plant-based proteins during the transition, rather than solely adopting a 'breaking down' approach to reduce animal protein consumption.

Evening meals
The majority of animal proteins are consumed during dinner (Eiwitmonitor: Vlees en Zuivel Nog Steeds Favoriet, Overgang Naar Plantaardig Gaat Niet Snel Genoeg, n.d.). Research indicates that 75% of main Dutch meals consist of fish or meat, highlighting dinner as a key opportunity for dietary shifts (Centraal Bureau voor de Statistiek, 2024).

2-2 Design approach

Transition design

To effectively support the protein transition, it is crucial to map design interventions across macro, meso, and micro levels, as shown in Figure 7. This approach examines their interconnections and explores potential interactions. While a design intervention might focus on one level, it will also impact the others. This requires a systems thinking approach (Dijkstra, 2023). For example, the macro level might involve the influence of Italian cuisine on the Dutch food landscape, while the micro level pertains to individual dietary choices, such as deciding to prepare pasta pesto for dinner on a Tuesday. Therefore, transition design is about design interventions and facilitating multi-level systemic change.

Human Centred Design

The project is approached from a system design perspective and focusing on Human Centred Design (HCD). Human Dentred Design is a practice where designers focus on four key aspects (Interaction Design Foundation, 2021):

- people and their context
- understanding and solving root problems
- understanding that everything is a complex system with interconnected parts
- the implementation of interventions

In essence, HCD is about fostering empathy for the user and integrating their needs into every stage of the design process. This is particularly important in projects centred around food procurement and consumption because food is a fundamental human necessity and deeply intertwined with culture, behaviour and routine. Ensuring that solutions are user-centric helps to create a desirable design.

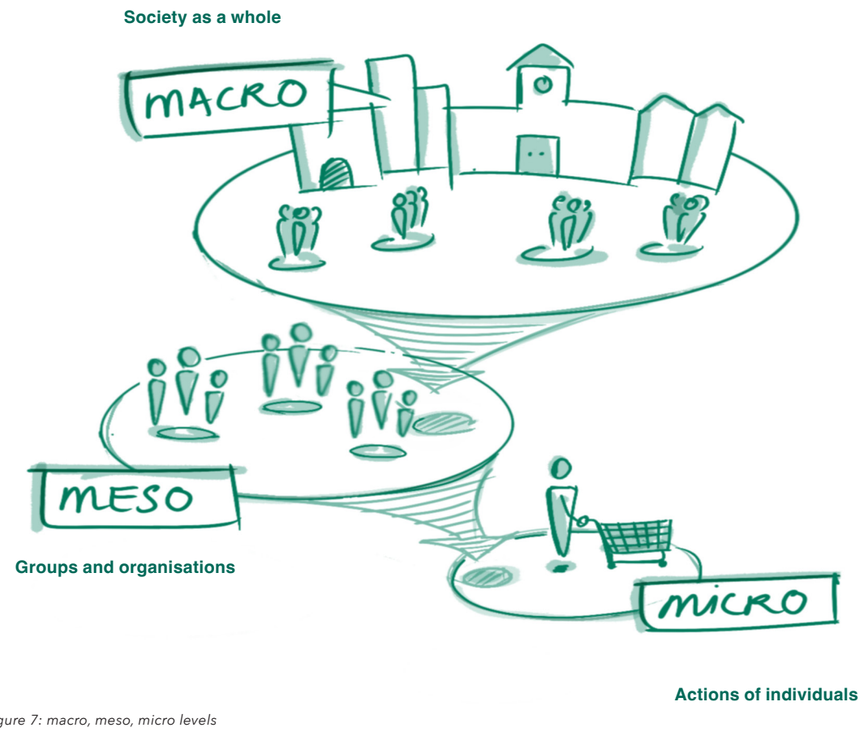


Figure 7: macro, meso, micro levels

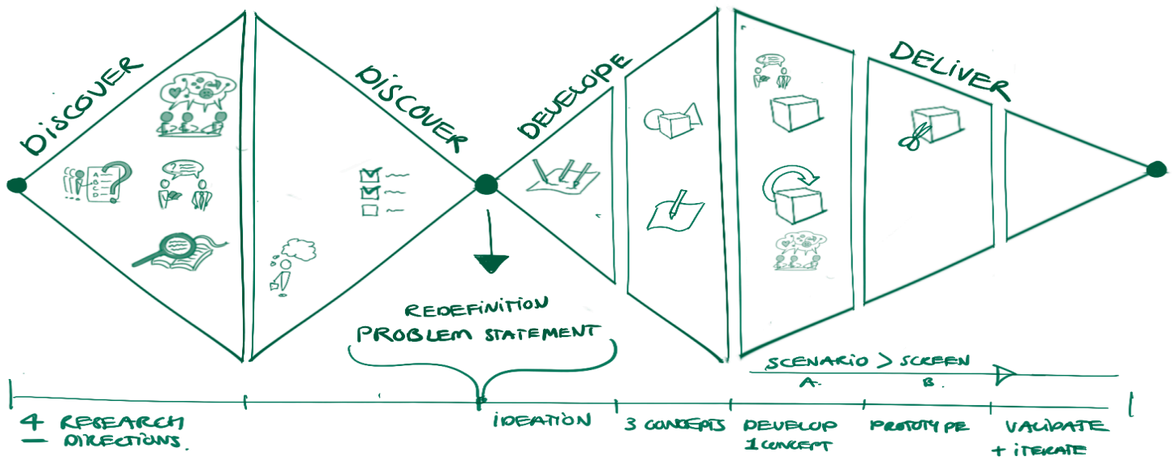


Figure 8: overview Double Diamond framework

Double Diamond framework

The approach of this thesis will implement the principles of Human-Centred Design using the Double Diamond method as a framework. This method offers a structured approach to guide the design process effectively containing four stages; discover, define, develop, deliver.

Discover

To address the research question, How can supermarkets inspire, guide, and stimulate young adults in composing plant-based meal recipes? The project began with a literature review focusing on supermarkets' role in the protein transition, consumer behaviour, and dietary design interventions. This was followed by field research that employed design methods such as questionnaires and context mapping to gain a deeper understanding of the target group's needs and preferences within the supermarket context.

Define

In the second phase, the gathered information will be analysed and structured in the COM-B model, leading to the creation of a storyboard and persona. This process will guide the development of design criteria and a refined problem statement.

Develop

The third phase involves ideation sessions in collaboration with the target group. The main problem is broken down into various subproblems to facilitate generative ideation methods, such as associative brainstorming sessions. The generated ideas are then analysed and organised into four concept directions, which are further refined into two final concepts and assesed.

Deliver

The final phase of the project involves selecting, developing, and validating a concept. First, one concept was chosen for further development and refined through co-creation design sessions to reach the final design. A Minimum Viable Product (MVP) test was conducted in a supermarket setting to validate the concept with the target group. This test identified areas for improvements for a final concept iteration and recommendations for further development.

2-3 Stakeholders

Figure 9 provides an overview of the key stakeholders in this design project related to the protein transition. At the center are the primary stakeholders: Flevo Campus, the consumer, and Albert Heijn supermarket. The following section details each stakeholder's role and interest in the design project.

Figure 9: Stakeholder analysis

Flevo Campus

This design project is supported and guided by Flevo Campus, an innovation and research center in the Netherlands focused on food transitions through experimental and action-oriented research. Flevo Campus aims to connect various stakeholders in the food system to accelerate the protein transition. They view citizens as active participants rather than passive consumers.

Consumer

Consumers seek to quickly purchase groceries for tasty and nutritious meals. By choosing plant-based proteins, consumers create a pull movement by influencing market trend and as drive the shift.

Albert Heijn

Albert Heijn is engaged in the protein transition, meeting consumer demand for more plant-based food options. Although the supermarket chain promotes plant-based products and sustainability initiatives, it must also prioritise its commercial interests. Consequently, the company's efforts in the protein transition are influenced by the need to balance environmental concerns with financial objectives.

Albert Heijn - BUN

BUN operates multiple Albert Heijn supermarkets in Almere and is interested in testing innovative concepts within their stores. However, they prioritise profit margins over the protein transition goals of Albert Heijn.

2-4 Project vision

Plant-based catalysts

The vision of this project is to transform supermarkets into important drivers of the protein transition, moving from a traditional 'you ask, we deliver' attitude to an innovative 'we inspire, stimulate, and guide' approach to plant-based consumption. By actively engaging with consumers and taking responsibility for influencing their behaviour, supermarkets can play a crucial role in fostering a more plant-based food landscape. With many supermarkets in the Netherlands aiming to offer 60% plant-based products by 2030 (Kamsma, 2019), there is significant momentum for design interventions within the supermarket setting to drive this transformation. Metaphorically speaking, the consumer and the supermarket are like two interlocking gears that need to be properly aligned to work effectively, representing the engine of the protein transition as illustrated in Figure 10.

Figure 10: engine of protein transition

Conclusions Chapter 2

As outlined in Chapter 1, this design project focused on the research question: How can supermarkets inspire, guide, and stimulate young adults in composing plant-based meal recipes? To address this, the project utilised principles of Transition Design, Human-Centred Design and the Double Diamond framework Through multiple phases, the project gains a comprehensive understanding of the target group's needs and engaged them in concept development. This approach results in the creation and validation of concepts designed to encourage young adults to adopt plant-based diets. Key stakeholders, including Flevo Campus, Albert Heijn and the consumers, are identified and analysed. Understanding their interests and needs is essential for designing interventions ensuring that the solutions are both effective and desirable.

B | section

Research

This section outlines the foundational literature and field research for this design project. Rather than focusing solely on the canned goods section where beans are typically found, the research adopts a comprehensive perspective of the entire supermarket. This broader approach aims to explore diverse design opportunities to answer the main research question:

How can the supermarket inspire, guide and stimulate young adults in composing plant-based meal recipes?

It starts by examining the potential role of supermarkets, particularly Albert Heijn, in the protein transition:

What role does Albert Heijn play in the protein transition?

Next, the research explores consumer psychology regarding food choices in supermarkets:

What theoretical frameworks explain the in-store food behaviour of young adults?

Finally, Chapter 5 investigates the consumer psychology of young adults in the supermarket setting through a questionnaire and contexmapping research:

How does the supermarket context impact young adults' decision-making when composing plant based meal recipes?

03 chapter | Supermarket

A supermarket plays the role of a value-adding intermediary between suppliers and customers as illustrated in Figure 11. The supermarket sources products from suppliers and then sells those products to customers. They add value:

- **A. by offering a wide variety of products.**
- **B. by providing competitive prices.**
- **C. by providing a convenient location for customers to shop.**

Albert Heijn, the largest supermarket chain with the biggest market share, holds significant potential in the protein transition. This chapter explores its role in addressing the following research question:

What role does Albert Heijn play in the protein transition?

The chapters starts with a historical analysis of supermarket development, focusing on in-store innovations. Next, it explores the contextual elements within the store that affect consumer decision-making. The final section evaluates Albert Heijn's objectives and design interventions related to the protein transition through a supermarket

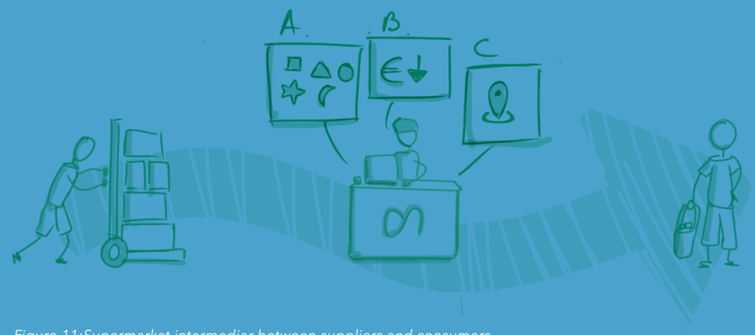


Figure 11:Supermarket intermediar between suppliers and consumers

3-1 Historical analysis

The concept of supermarkets is now ubiquitous in modern Western society. Over the past century, supermarkets have evolved significantly since the first store opened in 1916 in Memphis. The timeline on the right reveals the historical, cultural, social (on lthe eft side) and technological developments (on the right side) that have shaped these retail spaces over time (center line). Understanding the development of supermarkets is of importance when designing concepts.

In-store design innovations

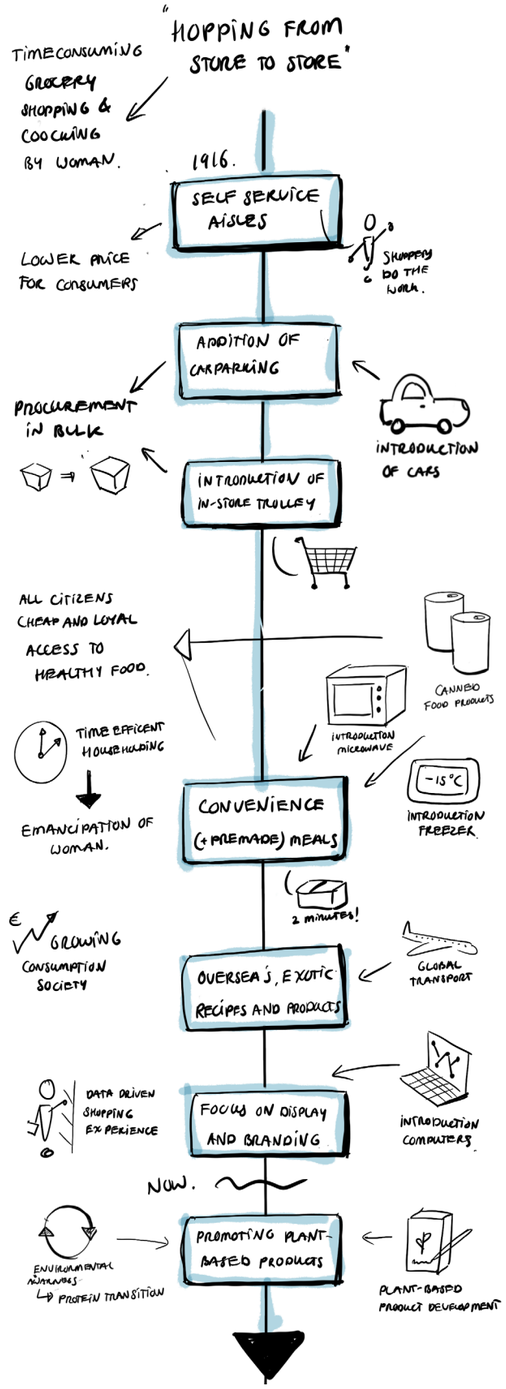
Design innovations are listed below to emphasise the importance of in-store design:

- By removing the pay desk and transitioning to a self-service model, supermarkets allowed consumers to collect their own food, a practice that was initially seen as unconventional and impolite.
- The technological innovation of the microwave led to the popularity of pre-made meals, reducing the need for meal planning and preparation time.
- The invention of the supermarket trolley allowed consumers to purchase more items, as they could easily carry more. The illustration below depicts the first trolley.

Figure 12: First supermarkt trolley (Admin, 2023)

Efects of protein transition

As illustrated at the bottom of the timeline, the protein transition, a social transition, impacts supermarkets and it stimulates innovations on plant-based food products. Supermarkets are promoting plant-based proteins by expanding their range of plant-based alternatives and reducing discounts on meat products. Nevertheless, many other interventions can be explored.



Design interventions

Shaping consumer choices

After decades of psychological research on consumer behaviour, supermarkets have evolved into carefully designed spaces that aim to maximise revenue while guiding shoppers through a curated experience (Chang, n.d.). The following strategies and tactics are employed to influence consumer behavior.

- Shoppers are greeted with the bright colours of fresh fruits and vegetables at the entrance of the store (see Figure 13). This sets a positive tone for their shopping experience, as supermarkets understand that happier shoppers tend to spend more (Chang, z.d.).
- Supermarkets strategically design their floor plans to influence customer behaviour and increase sales by analysing how aisle and display arrangements impact shopper movement and purchasing decisions (Dong et al., 2017).
- Shelf positioning has a significant impact on consumer behaviour. The arrangement and display of products on shelves influence consumers' buying decisions.
- In-store advertising uses flyers, digital ads, and displays to create awareness and influence purchasing decisions (see Figure 14).

Figure 13: Fresh fruits and vegetable section at entrance

Figure 14: In-store screens for advertisement

3-2 Albert Heijn in transition

As explained in the previous paragraph, the protein transition is influencing the supermarket industry. Several Dutch supermarkets, such as Dirk and Jumbo, are implementing strategies to increase plant-based protein sales. Albert Heijn, which held the largest market share at 37.1% in the Netherlands in 2023 (Van Rompaey, 2024), has the potential to make significant impact on the protein transition. Additionally, Albert Heijn is the most popular supermarket among the young adults. What are Albert Heijn's goals for the protein transition, and how effective are their strategies in meeting these objectives?

Sustainability report 2023

In Albert Heijn's 2023 sustainability report, they set the following goal regarding the protein transition:

"Our goal is for 50% of the proteins sold in 2025 to be plant-based, and for 60% by 2030. This ambition exceeds the targets set by the Paris Climate Agreement and the Dutch government, which aim for 50% plant-based proteins by 2030. We work towards our goals as concretely as possible by setting annual targets. This approach helps us achieve our ultimate ambitions for 2025 and 2030. In 2023, 44.1% of the proteins sold were plant-based, an increase from 42.6% in 2022. The goal for 2024 is 47%. Although the 2025 target is challenging, it is certainly attainable. If customers choose to consume a plant-based product instead of an animal-based product just once more per week, it would already contribute 3.3 percentage points towards our goal".

Figure 15: Protein transition goals

How does Albert Heijn measure their protein percentages?

Albert Heijn and other supermarkets work with the Green Protein Alliance to measure protein amounts through the Protein Monitor. This initiative aims to provide an accurate overview of the protein transition. Albert Heijn is actively involved in developing the Protein Monitor methodology and plans to join the next phase, which will calculate protein ratios at the product level. The goal is to make this approach the standard within the Protein Monitor.

Influencing consumer behaviour

Albert Heijn aims to inspire and encourage consumers to choose plant-based proteins by showcasing these options as delicious, affordable, and healthy. In their sustainability report, they identify changing customer behaviour as the biggest challenge of the transition. To evaluate Albert Heijn's efforts, several design interventions were examined during an in-store and online supermarket safari and mentioned below.

- Albert Heijn provides inspiration for plant-based recipes through their (online) Allerhande magazine. In 2023, they added 306 vegetarian and 201 plant-based recipes to allerhande.nl.
- Albert Heijn launches a plant based product line named AH Terra (see Figure 19).
- Albert Heijn raises awareness about the positive impact they can have by providing information about emissions linked to protein source of products (see Figure 20)
- Albert Heijn suggests plant-based recipes in-store with wobblers (see Figure 18).
- With 'lekker bezig' ('you are doing great') instagram campaign, Albert Heijn promotes positive sustainable behaviour (see Figure 16).
- Through posters, Albert Heijn aims to influence their consumers to make sustainable choices and the canned goods section (see Figure 17).

Albert Heijn and beans

In their sustainability report, Albert Heijn outlines their goal to increase bean consumption by expanding the variety in the canned goods section and incorporating beans into pre-made meals. Some stores are innovating by offering beans in various types of packaging. For example, the BOON brand enhances the appeal of beans with colorful packaging and recipe suggestions.

Figure 16: 'Lekker bezig' campaing

Figure 17: In-store posters

Figure 18: Wobblers promoting recipes

Figure 19: Ah Terra product line

Figure 20: Allerhande magazine

Analysis

Albert Heijn is transparent about its goals for the protein transition and uses multiple channels to influence customer behaviour. Both in-store and online, they provide vegetarian recipes and utilise various promotional tools, such as wobblers and posters. Additionally, they offer a wide range of plant-based products.

However, the effectiveness of these interventions is uncertain. For example, a poster above the canned goods section may not be compelling enough to encourage consumers to choose more beans. Similarly, while their website offers numerous plant-based recipes, these may not effectively reach or influence consumer choices. While informing customers about the emissions associated with their food choices could potentially inspire them at home, it is unclear whether this will translate to different purchasing decisions in-store.

Design opportunity

To achieve their sustainability goals, Albert Heijn could focus on more engaging strategies that foster behaviour change, specifically targeting in-store decision-making. Transforming the entire supermarket into a fully plant-based establishment would be excessively innovative. However, exploring and testing other in-store strategies could enhance the supermarket's role in the protein transition.

Conclusions Chapter 3

What role does Albert Heijn play in the protein transition?

Supermarkets have evolved over time, shaped by technological advancements and societal changes. This evolution has led to various in-store design innovations, such as pre-made meals. Albert Heijn, in response to the societal shift towards plant-based diets, has implemented several design interventions to support the protein transition. Their sustainability report outlines ambitious goals for increasing the proportion of plant-based proteins in their product range. Initiatives like providing recipes and launching new product lines underscore their commitment to this transition. However, the actual impact of these interventions on consumer behaviour remains uncertain. While Albert Heijn has expanded its plant-based offerings and promoted them through multiple channels, the effectiveness of these strategies in influencing in-store purchasing decisions is unclear. Posters and online recipes alone may not be sufficient to drive significant changes in consumer behaviour. Other design strategies should be explored focussing on in-store decision making.

04 chapter

Consumer behaviour

Understanding consumer behavior in supermarkets is essential for developing effective design interventions. Therefore, this chapter addresses the following research question:

What theoretical frameworks explain the in-store food behaviour of young adults?

This chapter explores in-store decision-making using the COM-B model to analyse factors influencing shopping behaviour. It also delves into the theories of system 1 and system 2 thinking. The following section focuses on the target audience, young adults, and their characteristics. Moreover, this chapter examines transformative design intervention (TD) frames and the potential of nudging and choice architecture. These strategies have the capability to subtly reshape the shopping environment, thereby encouraging more sustainable decisions among shoppers.

4-1 Behaviour theory

COM-B model

Behaviour is defined by how someone acts. Changing dietary habits involves modifying these actions. The Behaviour Change Wheel (BCW) is a method used to pinpoint necessary changes for designing effective behaviour interventions. The wheel consists of multiple layers. This research focusing on its inner layer known as the COM-B model. This is a model that allows identifying what needs to be changed by considering someone's capability and opportunity to engage in a particular behaviour and someone's motivation to perform it.

- **Capability** refers to the skills and the knowledge (physical and psychological) needed to perform a certain behaviour or to change or stop a behaviour.
- **Opportunities** are external influences (social and physical) to the individual. Physical opportunity is afforded by the built environment.
- **Motivation** refers to the conscious and unconscious (automatic and reflective) cognitive processes that direct behaviour.

To change someone's behaviour, designers can develop interventions that alter one or more components of this behaviour system (Michie et al., 2011).

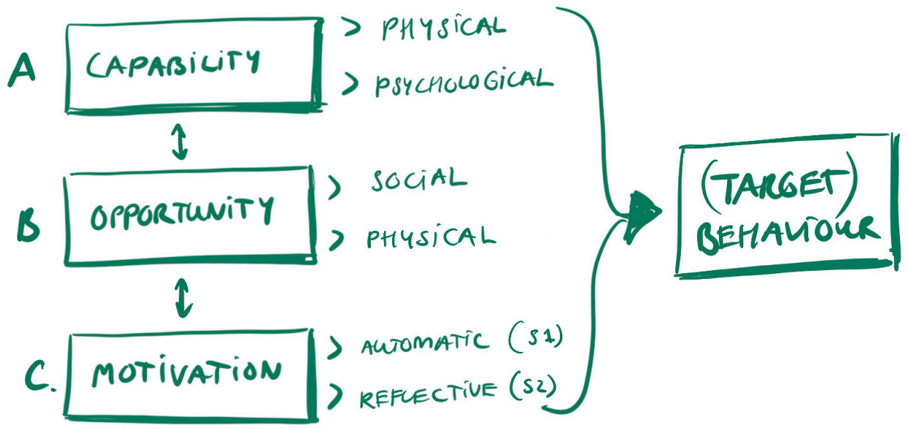


Figure 21: COM-B Model

Two systems

As the COM-B model decribes, food-related behaviour and decisions are shaped by various factors, both internal and external. On a daily basis, people make on an average more than 221 food related decisions (Wansink & Sobal, 2007). These decisions could be categorised into two categories:

- System 1 (95%) is characterised by quick, automatic, associative and often habitual decision-making, where people rely on contextual cues.
- System 2 (5%) refers to analytical, rule-based and relatively slow decision-making, where people process information thoroughly and consciously (Kahneman, 2003; Stanovich and West, 2000).

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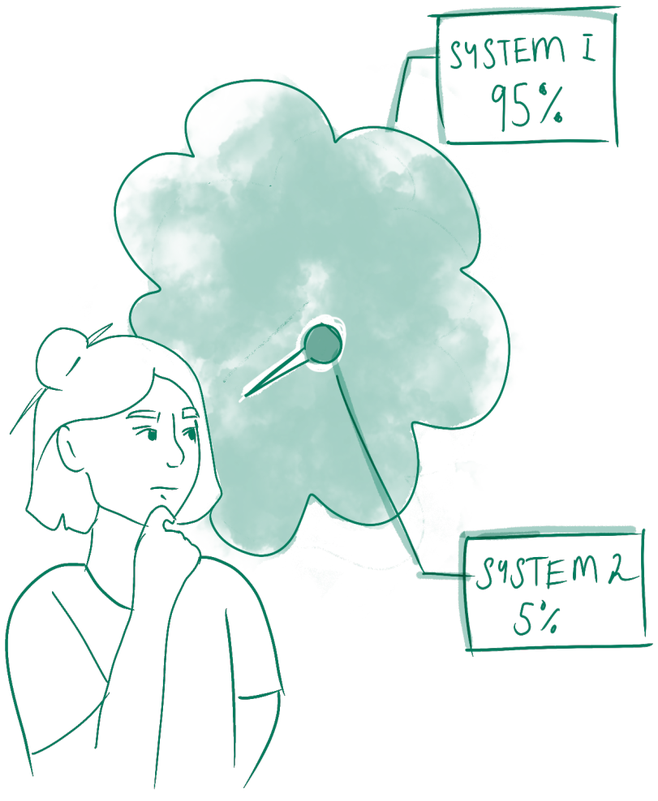


Figure 22: System1 and System 2 thinking

Opportunity

Behaviour researcher Ben Tiggelaar highlights the significant role of physical context in influencing behaviour. Therefore, the supermarket in-store context create the opportunity for specific behaviours to occur. The predominance of system 1 thinking underscores the supermarket's role in changing consumer behaviour through its designed in-store environment. For this reason, phyicial opportunity within the COM-B model is the focus point of this project.

4-2 Target group

Focusing on specific target groups is essential because interventions tailored for one group may not work for another. For instance, luxury meat substitutes might not be suitable for individuals with lower incomes. Based on the analysis of the protein transition in Chapters 1-3, it would be beneficial to target flexitarians. This thesis focuses on young adults, a segment most open to dietary changes and adopting a flexitarian diet.

Open to change

Research from Vrije Universiteit Amsterdam (2020) shows that a majority of Dutch people (72%) believe we should consume more plant-based and fewer animal products. Young adults (18-34 years) are the most receptive to various interventions to achieve this goal. Within this demographic, there is strong support for replacing animal ingredients, increasing the availability of plant-based options, and making plant based food choices the standard. In the lives on young adults significant life events often occur, such as leaving the parental home, starting or changing jobs, pregnancy, or moving in with a partner, which can disrupt existing routines. This makes consumers more open to changes in their behaviour. According to research from the Netherlands Environmental Assessment Agency (De Krom, Vonk & Muilwijk, 2020), such life events create 'windows of opportunity' to break existing (food) routines and promote more sustainable eating habits.

Convenience and experimenting

Young adults display the following traits in their food consumption and grocery shopping. They prioritise convenience in their food choices, often opting for quick and easy meals over cost or nutrition due to their busy urban lifestyles. Their decisions are frequently based on intuitive thinking. Moreover, they enjoy experimenting with recipes and value new culinary experiences (Millennial Food Statistics And Trends in 2024 • Gitnux, 2023).

Value-action gap

Additionaly, this group is known for their biospheric values in their food choices, indicating a concern for the environment. However, there is often a gap between these values and their actions, as they wish to do more for the environment but lack concrete actions, known as the value-action gap. This gap arises when there's inconsistency between what individuals prioritise, like 'climate change', and their actual behaviours, such as buying meat (Blake, 1999; Schanes et al., 2018). Studies indicate that biospheric values have limited influence on purchasing decisions in supermarkets, highlighting this gap (Asif et al., 2018). Recent studies emphasise the importance of considering the 'situational context' as a variable influencing the value-action gap (Carrington et al., 2010; Sultan et al., 2020), because factors like store layout a significantly impact whether environmentally conscious values guide purchasing decisions. To bridge the gap between values and behaviour, a design intervention must address both quick, instinctive decision-making, System 1, and more deliberate, rational decision-making, System 2' (Peeters et al., 2022)

In conclusion, young adults in the Netherlands play a crucial role in the protein transition due to their adaptability and environmental values. They prioritise convenience while also enjoying the process of experimenting with new recipes.

4-3 Behaviour change

Strategies towards behaviour change

To drive behavior change among supermarket consumers, it's crucial to implement design interventions that aid sustainable decision-making. Various strategies can boost plant-based consumption and reduce reliance on animal products. Eight categories of consumer interventions have been identified to promote plant-based diets (Peeters, 2024). Combining these targeted interventions can effectively support the protein transition through transformative design approaches.

1. **Sustainable Doppelgangers**: Support existing consumption patterns with convenient, sustainable alternatives.

2. **Silent Steering**: Help consumers make responsible choices discreetly through nudges in choice architecture.

3. **Gentle Guidance**: Assist conscious consumers with supportive measures.

4. **Be the Transition**: Encourage everyone to become a changemaker by joining a movement.

5. **Shifting Meaning**: Celebrate plants as meaningful and appealing sources of protein.

6. **Cracking the Discourse**: Challenge the status quo through public provocation.

7. **Changing the Rules of the Game**: Modify the food supply through coercion and regulation.

8. **Beyond the Anthropocene**: Restore our connection with nature through alternative food networks.

Transformative design interventions can be adapted to various design scenarios. For example, when designin interventions for Romans who value traditional dishes like pasta carbonara, an effective strategy might involve reducing the amount of meat in these dishes rather than eliminating it entirely. In this project, three design interventions have been selected based on their potential to influence the behaviour of young adults within the supermarket context. These interventions are detailed below.

Changing the rules of the game

First, the vision of this thesis aligns with the strategy of 'Changing the rules of the game' by transforming supermarkets from passive suppliers to active influencers of consumer behaviour, promoting plant-based proteins. This shift aims to inspire and guide consumers towards sustainable choices, reflecting the TD framework's focus on reshaping market dynamics through interventions by key players like supermarkets.

Silent steering

Secondy, the frame of 'Silent steering' modifies the retail environment to encourage sustainable food choices, making plant-based proteins more appealing through convenience, visibility, accessibility, and incentives. This "nudging" method promotes plant-based eating habits without restricting options.

Gentle guidance

The third frame named 'Gentle guidance' focuses on conscious behaviour change by educating and engaging consumers, especially flexitarians, about plant-based diets. It provides practical guidance to enhance skills and knowledge for lasting bahaviour change, aiming to shift food practices and empower retailers and institutions to influence consumption patterns.

4-3 Decision making

In-store decision making

As mentioned before, many food decisions are made in-store. For everyday choices such as supermarket shopping, our biospheric values often compete with values like cost, enjoyment, and convenience (Renner et al., 2012; Salmivaara et al., 2021; Steptoe et al., 1995; Yamoah and Acquaye, 2019). Immediate costs are directly felt, while environmental impacts are abstract and distant, overshadowing biospheric values among flexitarians in retail contexts. When shopping, people's mindset and circumstances significantly influence their instinctive System 1 thinking, which often overrides analytic System 2 thinking (Baumeister, 2002; Muraven and Baumeister, 2000). Shopping after a busy day can reduce decision-making capacity, making shoppers more responsive to in-store cues (Bargh and Ferguson, 2000; Bargh, 2011).

Choice architecture

Choice architecture refers to how the design of an environment influences our decisions through factors like pricing, product placement, and branding (Sydney Business Insights, 2021). For instance, Netflix's effective choice architecture helps users easily find content. Similarly, supermarkets use choice architecture to guide purchasing decisions, primarily by appealing to consumers' instinctive, automatic thinking (System 1) (Peeters et al., 2022). This concept can be applied to encourage a shift towards plant-based diets.

Nudging

A nudge is a subtle aspect of choice architecture that influences behaviour predictably without banning options or using strong incentives (Radova, 2022). By adjusting our surroundings, nudges can promote healthier, more sustainable, or more beneficial choices while preserving freedom of choice. Simple changes like altering packaging colors or item placement on shelves can profoundly impact consumer decisions. Nudges are considered gentle pushes toward desired outcomes, simplifying complex decision-making processes (Thaler and Sunstein, 2008).

Conclusions Chapter 4

What theoretical frameworks explain the in-store food behaviour of young adults?

The COM-B model provides a comprehensive framework for understanding the key factors that influence behaviour change. The design project targets young adults, who are known for their flexibility in dietary habits and their focus on convenience. This group often faces a value-action gap, where their environmental concerns do not translate into actual purchasing decisions due to competing factors such as cost and convenience.

The supermarket environment plays a crucial role in shaping consumer decisions, which are often driven by automatic reasoning, especially after a busy day, rather than by deliberate thought. To encourage plant-based consumption, behaviour change strategies such as silent steering and gentle guidance can be effective. 'Silent steering' involves adjusting the retail environment to make plant-based options more convenient, visible, and appealing. It uses nudges within the supermarket's choice architecture to subtly encourage sustainable food choices without limiting options. 'Gentle guidance' focuses on enhancing skills and knowledge of young adults about plant-based diets.

05 chapter | Field research

This chapter shifts from desk-based research to field research, focusing on young adults and their behaviour in supermarket settings. Especially after a long day, consumers are strongly influenced by their environment while shopping and young consumers often arrive at the supermarket unprepared. These insights leads to the following research question:

How does the supermarket context impact young adults' decision-making when composing plant - ased meal recipes?

This chapter explores opportunities to increase plant-based protein consumption by examining their in-store behaviours related to plant-based recipes and beans purchasing. The research utilises two user-centered research methodologies: a questionnaire and a contextmapping session.

5-1 Approach

How can purchasing behaviour on evening meals be influenced in the supermarket? To better answer this question, a questionnaire and contextmapping session was conducted focusing on the behaviour, needs, and aspirations of the consumer in context of the supermarket. Engagement with young adults in their context will provide a clear picture of their current behaviour and potential pain points, revealing opportunities for dietary change.

The goal of the field research is to gain insights that will help make the intervention fit the world of the target audience. To achieve this, five main topics were set up.

1. Food routines
2. Grocery shopping management
3. In-store recipe composition
4. Needs regarding plant-based meals
5. Drivers and barriers of bean consumption.

Figure 23: Google Forms quesionnaire

5-2 Questionnaire

To identify trends and patterns related to the five themes mentioned earlier, a questionnaire was designed to collect quantitative data.

Procedure and respondents

- Medium: Google Forms (see Figure 23)
- Respondents: Out of 125 respondents, 53 were identified as young adults. Recruitment was conducted via the Flevo Campus website and social media platforms, including WhatsApp, Instagram, and LinkedIn, with the following message: "Hi! Can you assist with my thesis by completing this survey on cooking and food habits? Thank you!"
- Documentation: Online database in Excel and Google Forms (see Appendix A)

Data Analysis

The data was analysed by filtering responses from young adults using Excel. This process served two main purposes:

- The filtered data helped identify key issues and challenges faced by the target audience, providing a qualitative foundation for understanding their needs and preferences.
- The insights gained were used to guide more detailed qualitative research during the context mapping session, enabling a deeper exploration of the target group's behaviours.

Limitations

- The closed questions restrict the depth of responses, as participants can tend to select from predefined options.
- Using specific recruitment channels, like the Flevo Campus website, leads to an overrepresentation of respondents who might have an interest in plant-based diets. This can result in a sample that is not fully representative of young adults, potentially causing response bias.

5-3 Contextmapping

In-store decision making is closely tied to the surrounding environment as explored in Chapter 3 en 4. Consumers' food choices are influenced by the layout and design of the store. Hence, it's crucial to understand the users in their context, as they hold the most expertise in their own experiences. The outcome of the quesionnaire confirmes that young adults often arrive in the supermarket without a grocery list. In this scenario, consumers are more influenced by the context of the supermarket, therefore this is an intresting opportunity for an in-store intervention and inspired the contextmapping session.

Method explained

The context mapping method provides an in-depth understanding of the underlying needs and values of young adults regarding supermarkets and how they utilise the supermarket to fulfill these needs and values. Contextmapping achieves this by employing artefacts, enabling a profound comprehension of a specific subject. It unveils not only the target groups explicit knowledge, such as opinions and reasons but also delves into their tacit and latent knowledge, including feelings and needs as depicted below (Sanders & Stappers, 2013). The contexmap serves as a guiding map for the design by structuring and localising insights. The map is regarded as a source of inspiration for design directions.

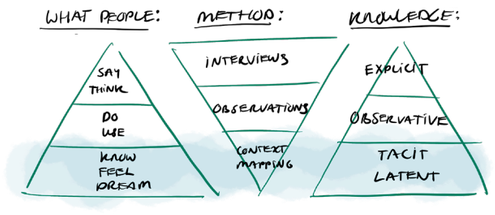


Figure 24: vision symbol engine protein transition

Structure

The session was structured around the five field research themes and based on the questionnaire results and literature review findings:

- What do consumers experience arriving at the supermarket?
- How do consumers choose a meal in-store when arriving unprepared at the supermarket?
- What latent needs, pain points, and motivations influence the choice for plant-based recipes in supermarkets?
- How do they percieve the canned goods section with beans?
- To what extent do consumers perceive responsibility for their sustainable dietary habits compared to supermarkets?

The contextmapping was organised around a cardboard floormap of a supermarket divided in aisle categories (see Figure 25). This artefact has a central position throughout the sessions and makes it easy for the participants to localise their thought and feeling in the context of the supermarket.

Figure 25: categorised floormap of supermarket

Participants and procedure

- Participants: (3 female, 2 male)
- Diet: Flexitarians
- Age: Between 25 and 35
- Setting: private room with big table

Figure 26: setting contextmapping sessions

1. Sentisising

Prior the the session, paricipants were asked to observe their own life and reflect on their own experience by
1. taking photos of the shelves in the supermarket inspires them the most.
2. saving their (paper or digital) grocery lists and bringing them to the session.

2. Session introduction

The session, a research study on food-related decisions in supermarkets, began with dinner to foster a friendly atmosphere. To avoid socially accepted answers, sensitive topics like food procurement and sustainability were initially avoided. Participants were invited to share their perceptions openly, with no right or wrong answers.

3. Session

To awnser question 1, 2, 3 and 4, participants were asked to complete various tasks and write their thoughts on post-it notes, which were then placed on a central map as depicted in Figure 27 To awnser question 5, the participants were asked to communicate their sentiment of responsibility division on a sustainable plant based procurement.

Analysis

The data of the context mapping includes post-it located on the floormap, notes and a recording. The recording was transcribed and checked manually after transcribing. The information from the recording together with the insights of the questionnaire and post-its were structured on the floor map as depicted in Figure 27. The colours are linked to the context mapping questions on the previous page. The important takeaways based on question 1, 2, 3 and 4 are presentered in the following paragraph. Question 5 is analysed in the final paragraph.

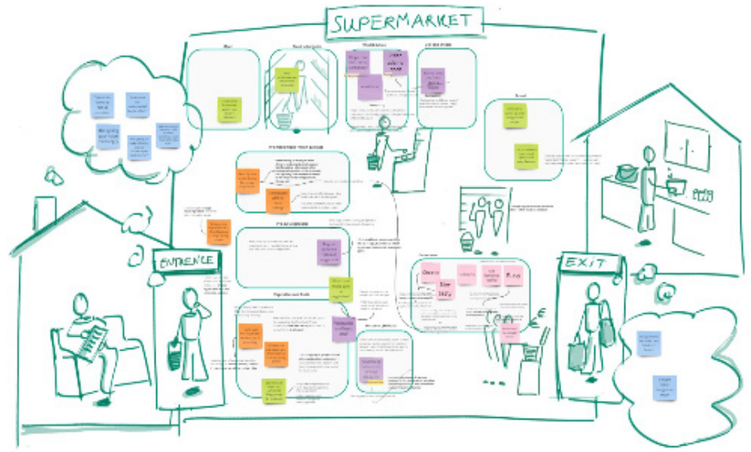


Figure 27: categorised floormap of supermarket - larger version in Appendix B

5-4 Takeaways

Based on the analysis of the field research from the questionnaire and context mapping session, the following key takeaways have been identified and structured in themes.

In-store recipe composition

- When entering the store, young adults prefer to plan their dinners quickly to avoid wandering in the supermarket.
- When arriving unprepared at the supermarket, the target group seeks to connect their foodmood, like “curry” or “comfort food”, to a specific recipe, using an ingredient or theme as a starting point.
- The target group feels unsatisfied buying a pre made dinner because they seek for a more costumised culinary experience.
- Selecting a weekday recipe is primarily based on taste, simplicity, convenience, and healthiness.
- Young adults enjoy experimenting by a constimising their recipes a little to avoid repetition
- The most common in-store frustrations are caused by having too much choice and being unable to find a specific product.
- Consumers experience an uncertainty whether a plant based recipe contains sufficient proteins.
- When composing a recipe in-store, flexitarians often lack the skills to prepare flavorful plant-based dishes.
- There is concern about the nutritional adequacy of plant-based meals, particularly regarding their protein content.
- Traditional AVG recipes are easier to prepare on the spot, while plant-based meals are perceived as more complex to make.

In-store inspiration

- Consumers use several strategies for in-store recipe inspiration: they browse the fresh section, search for recipes on their phones, select from their recipe libary, examining premade meals, exploring the discount section, selecting fresh ingredients or wander around the supermarket for inspiration
- When using a phone to search for a recipe, the user gets frustrated by the many options, advertisement, scolling and unclear discriptions.
- Consumers look for a starting point that align with their foodmood. This could be one ingredient or a specific kitchen recipe theme.
- Consumers appreciate encountering new products and recipes for variety but prefer not to invest effort in actively searching throughout the supermarket
- In the supermarket, young adults are inspired to try new products and recipes through discounts, recommendations from others, unique flavors, and sustainability benefits.
- Consumers perceive the wide variety of fresh products and discounts as positive aspects of their in-store experience.
- Young adults explore the in fresh vegetable section and the world kitchen for inspiration.

Beans

- Beans found in the canned goods section are associated with unappealing products, discouraging consumers from exploring this aisle.
- Consumers do not eat beans because it is not in their routine and they don’t know recipes with beans.
- The most common recipes people know with beans are curries, wraps and chili sin carne.

Responsibility division

As shown in the pie charts in Figure 29, the average response indicates a preference for supermarkets to take greater responsibility. Conversations during the context mapping session further suggest that participants agree more action is needed from supermarkets to foster behaviour change toward more plant-rich food consumption, resulting in the following takeaway:

- Consumers believe that supermarkets should take more responsibility in promoting sustainable food choices.

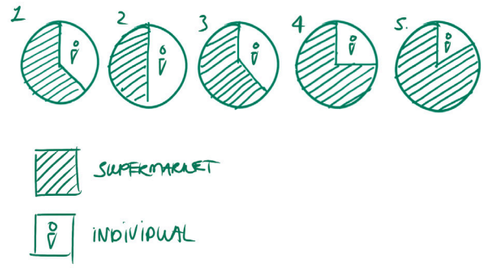


Figure 28: Visual analysis of results

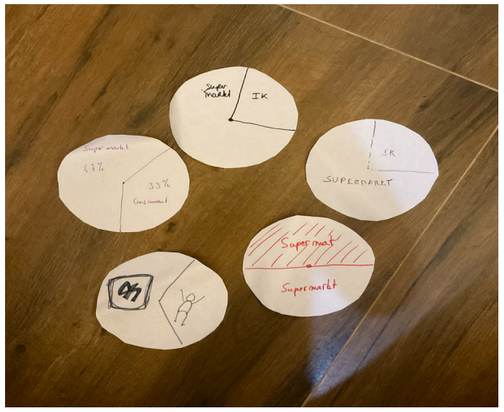


Figure 29: Pies drawn by participants

Conclusions Chapter 5

How does the supermarket context impact young adults’ decision-making when composing plant based meal recipes?

The context mapping and questionnaire results revealed that young adults face difficulties coming up with plant-based recipes while shopping. After a long day, they prioritise flavour, nutrition, and convenience, aiming to exit the supermarket quickly. Traditional AVG recipes are easier to prepare on the spot, while plant-based meals are perceived as more complex to make. They often enter the store seeking inspiration for their meals, looking for guidance on how to build recipes based on their food mood. They seek inspiration from fresh produce, phone searches, standard recipes, pre-packaged options and by exploring the store. Once they identify their foodmood, they struggle to think of nutritious and tasty plant-based recipes. Time pressure and choice stress often lead to frustration. Beans are rarely considered in evening meals due to absence from their recipe libary. In summary, consumers develop their own strategies for finding inspiration and guidance for composing recipes in-store.

C | section

Synthesis

This section synthesizes the outcomes of the research phase, serving as a transition section from the ‘discover’ phase to the ‘define’ phase of the double diamond framework. In chapter 6, the the research outcomes are applied to create a persona that humanises the target group and specifies their food-related aspirations and frustrations. The persona’s pain points are then visualised in the supermarket context through a storyboard, helping to uncover design directions and communicate the research findings with project stakeholders. Following that, the design statement is redefined and the project’s design criteria are presented.

06 chapter | Design focus

This chapter transitions from the ‘Discover’ to the ‘Define’ phase of the Double Diamond framework. It organizes insights using the COM-B model, a persona, and a storyboard. From the storyboard, a design statement is developed. Finally, design criteria are established.

Initially, the problem was centered on promoting beans in the canned goods section of the supermarket. The literature and field research revealed that young adults rarely visit the canned goods section, because beans recipes are not in their recipe library. Also, they often enter the supermarket unprepared and lack the inspiration to compose plant-based recipes. Therefore, the focus shifted from the canned goods section to helping young adults create plant-based recipes.

6-1 COM-B model

This paragraph integrates the outcome of the field research into the COM-B model, providing a comprehensive view that identifies the key aspects the intervention must address to achieve behaviour change.

Capability

- Consumers must gain experience to develop the skills of composing tasty and nutitious plant-based dishes on the spot.
- Consumers lacks the skills of making tasty recipes with beans

Opportunity

- The supermarket context does not offer sufficient in-store guidance in composing plant-based recipes.
- The supermarket offers too many ingredient options, making it difficult to chose.
- Consumers look for a starting point for recipe inspiration in the supermarket.

Motivation

- Consumers value inspiration from discovering new products and recipes in the supermarket.
- Preference for customising existing recipes rather than creating new ones suggests a capability for adaptation rather than innovation.
- A desire to align recipes with mood preferences (e.g., “curry,” “comfort food,” “convenience”) indicates motivation to explore and purchase plant-based options.

Target behaviour

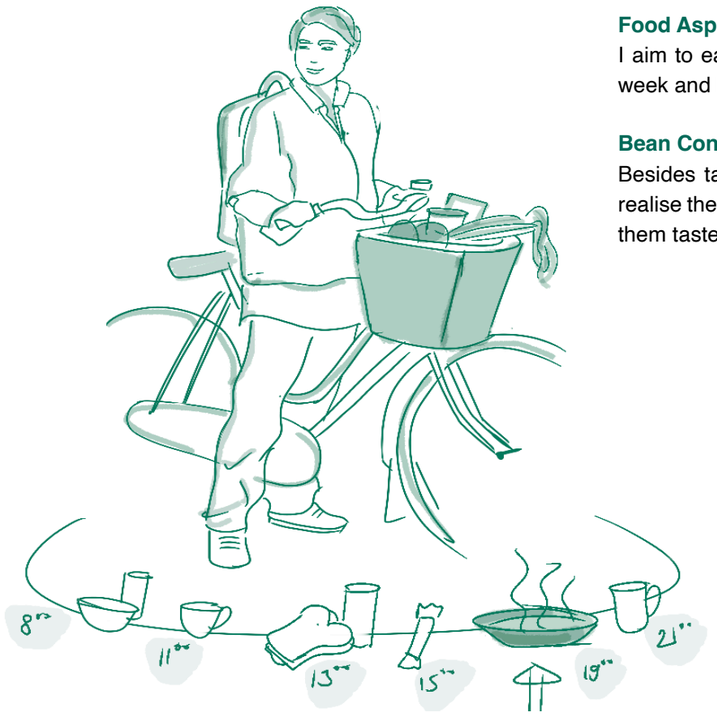
Composing plant-based recipes, including beans, while shopping in-store.

6-1 Persona

A fictitious persona named Jonas has been created to represent the target audience. Personas are archetypal profiles that embody the behaviours, values, and needs of intended users. Utilising this persona facilitates the integration of the target audience's characteristics and lifestyle into the design phase. Additionally, Jonas serves as a valuable communication tool, clarifying the design's intended user. While young adults form a broad demographic, Jonas represents a specific segment within this group.

Bio

Age:	**32 year**
Location:	Rotterdam
Household:	One housemate
Profession:	Journalist
Recipe library:	Paprika soup, Noodles salade



Perfect Weekday Recipe

I want the recipe to be tasty, finished within half an hour, and earn a compliment from my housemate for my personal culinairy touch to the dish.

Supermarket Frustrations

I struggle to think of tasty and nutritious plant-based meals during the week when I arrive at the supermarket after work.

Food Aspirations

I aim to eat more plant-based recipes throughout the week and learn some culinary skills along the way.

Bean Consumption

Besides tacos, I don't know any recipe with beans. I realise they are healthy, but I have no clue how to make them taste good.

6-2 Story board

What are Jonas's in-store pain points? This storyboard illustrates Jonas's challenges in context, specifically when entering the supermarket unprepared after a long workday as depicted on the rights illustration. It highlights his difficulties in finding inspiration and guidance for creating plant-based recipes, including beans. The following storyboard visualises these issues and how they affect his shopping experience. Following that, the design statement is derived from the insights provided by the storyboard.

A. INSPIRE

As Jonas enters the store, he determines his foodmood and seeks inspiration by asking, "What should I have for dinner tonight?" He looks for a starting point for his recipe selection, such as an ingredient, cuisine type, or recipe theme.

B GUIDANCE

Once he identifies the starting point, Jonas enjoys to create his own recipe but often lacks the ability to quickly prepare a convenient and nutritious plant-based dinner. He requires guidance to develop plant-based recipes.

C. STIMULATE

Jonas did not plan to make a recipe with beans because he is unfamiliar with bean-based recipes. To increase bean consumption, he should be stimulated in-store to try recipes with beans.

To address these pain points and encourage Jonas to choose plant-based meals, the following design statement is formulated:

"To stimulate young adults to choose plant-based meals, we want them to feel eased and inspired by providing convenient and appealing recipe suggestions that make plant-based choices effortless and enjoyable."

6-5 Design criteria

To ensure the intervention aligns with the main stakeholders, specifically the target group and the Albert Heijn, design criteria have been established, The criteria are derived from both literature and field research.

Inspire in foodmood

In the user scenario, the consumer often enters the supermarket unprepared and feels overwhelmed by the many choices. The design should inspire the consumer to define their food mood.

Costumisable

Considering the subtle experimental nature of the target group, the design should allow it to easify customisation of their own recipes.

Plant based rewarding

The design must not attract consumers by highlighting in-store sustainable benefits, ensuring it doesn't come across as repelling. Sustainable choices should feel rewarding and exciting, even if they aren't a top priority for shoppers.

Bahaviour change

To encourage dietary behaviour towards consuming more plant-based meals, the design should incorporate both System 1 and System 2 thinking, offering practical guidance to enhance skills and knowledge.

Minimal cognitive effort

The in-store supermarket showcase should require minimal cognitive effort from the user, who often feels hurried, tired, and hungry, leading to limited cognitive capacity.

Quick in use

The target group want to leave the supermarket as fast as possible and therefore the concept should be quick and efficient in use.

Beans recipes

Considering that the target group does not include beans in their diet because they lack bean recipes in their recipe library, the design intervention must facilitate the introduction of bean through recipes to the consumers.

Sustainability goals

The design should boost sales of plant-based proteins, supporting Albert Heijn's sustainability goals on the protein transitiont towards 60.

Conclusions Chapter 6

The COM-B model identifies key factors for behaviour change: enhancing capability through skill-building, improving opportunity with better in-store guidance, and boosting motivation with engaging recipe inspiration. Jonas, our persona, illustrates the specific issues young adults face, such as finding inspiration for plant-based meals and lacking knowledge of bean-based recipes. The design statement derived from these insights is:

"To stimulate young adults to choose plant-based meals, the goal is to make them feel eased and inspired by providing convenient and appealing recipe suggestions that make plant-based choices effortless and enjoyable."

To align with stakeholders and address Jonas's challenges, design criteria have been set. These criteria focus on inspiring foodmood, allowing for customization, making plant-based options rewarding, and minimising cognitive effort. The design should be quick to use, introduce bean recipes effectively, and support Albert Heijn's sustainability goals by increasing plant-based protein sales. This structured information sets the stage for the development phase.

D | section

Development

In this section, the design invervention will be developed. The main problem statement is broken down into various subproblems to facilitate generative ideation methods. Ideas are generated through a user-centered design approach are analysed and structured into four concept directions. Following that, two concept are elaborated and one ne concept is selected and iteratively refined toward of a final concept.

07 chapter | Ideation

Chapter 7 marks the beginning of the second diamond in the Double Diamond framework, focusing on the ideation phase. This chapter details the creative process, including idea generation and concept development. Ideas were generated through individual sketching and a brainstorming session with designers and the target group. These ideas were refined into four initial concept directions and evaluated by food industry experts from Flevo Campus. The concepts were further assessed using the Harris Profile method, leading to the selection of the recipe generator concept. This evaluation identified two key criteria essential for the development of the recipe generator, which will guide further concept development in Chapter 8.

7-1 Idea generation

To diverge from the problem statement and think of a design solution beyond my personal perspection, vairous ideation sessions with colleagues from Flevo Campus and a co-creation with the target group was conducted. In both ideation sessions, ideas were generated with the 'how-to' method based on the following questions:

Recipes composition
- How to compose recipes?
- How to compose recipes in-store supermarkets?

Beans
- How to improve the image of beans?
- How to increase the visibility of beans in-store supermarkets?
- How to convince someone of a new flavour?

Over 100 ideas were collected and merged with ideas from individual sketching sessions. Resulting in multiple digital sketching boards viewerd in the following page. The ideas were collected through three different types of ideation sessions (see Figure 28)

Figure 28: Categories of ideation sessions.

1. Brainstorm with target group

By conducting a brainstorming session with the target group, ideas inspired by their specific needs and preferences were developed. The sessions began with an introduction to the topic, followed by each participant sharing their main supermarket-related frustration, with the next person offering the initial solution that came to mind. This approach emphasized generating a high quantity of ideas over perfection. To facilitate idea communication through drawing, sessions started with a warm-up game of Pictionary, lowering the barrier to sketching and creating a playful atmosphere.

2. Brainstorm expert sessions

Two generative brainstorming sessions were conducted with Mette Beerda, a consumer behaviour expert from Flevo Campus. These sessions were focused on behaviour change perspectives to generate effective ideas.

3. Individual sketching

Individual idea generation involved techniques such as brain drawing and drawing inspiration from conversations with people in my community or strangers, such as during train rides. Occasionally, ideas would emerge late at night and were noted down in a notebook.

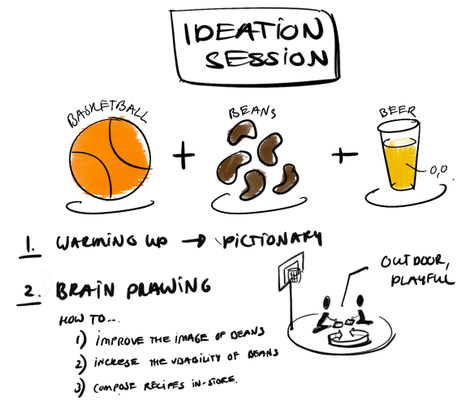
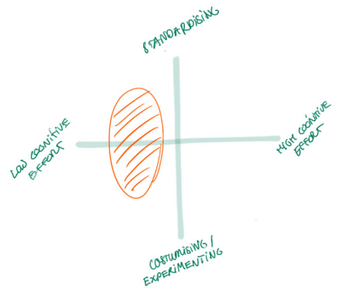


Figure 29: Inventation for brainstorm sessions 1

7-2 Concept directions

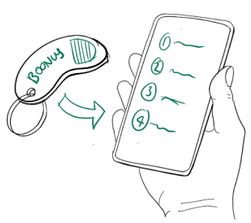
After compiling all ideas into sketching boards, they were evaluated and structured by placing them on a coordinate system with design criteria. This method organises and assesses the ideas on the left page.



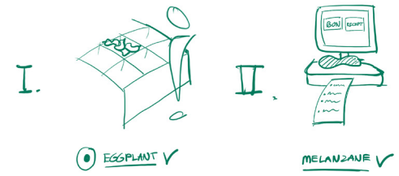
Next, four concept directions were identified:

1. Uncanning beans
The first concept is based on the hidden character of canned beans in the supermarket: 'Unknown makes unloved.' This concept reveals the bean in-store through a tasting plateau close to the canned goods section.

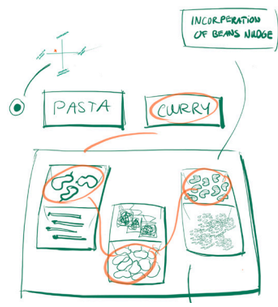
2. BOONus card
The BOONus concept direction integrates beans into consumers' recipe libraries through a marketing program. By using a BOONus card, consumers can earn BOONus points that provide discounts on beans and unlock bean-based recipes on the AH application. This approach promotes beans in a humorous manner while emphasising their sustainable and health benefits.



3. Vegetable > scale > recipe
This concept incorporates the fruit and vegetable scales in the fresh produce section by integrating features that suggest plant-based recipes. The scale analyses the selected vegetable and recommend s recipes based on the vegetable's flavour and texture profile with a matching type of beans. After weighing the produce, consumers can print out the suggested recipe along with their receipt.



4. Pairing ingredients with foodmood
The fourth concept direction simplifies the consumer's selection process by categorising ingredients according to two types of food moods, such as pasta or curry. Consumers can personalise their ingredients by choosing from limited options displayed on a shelf. Beans are included on this shelf as a protein source, ensuring they are easily accessible and integrated into meal choices based on the selected foodmood.



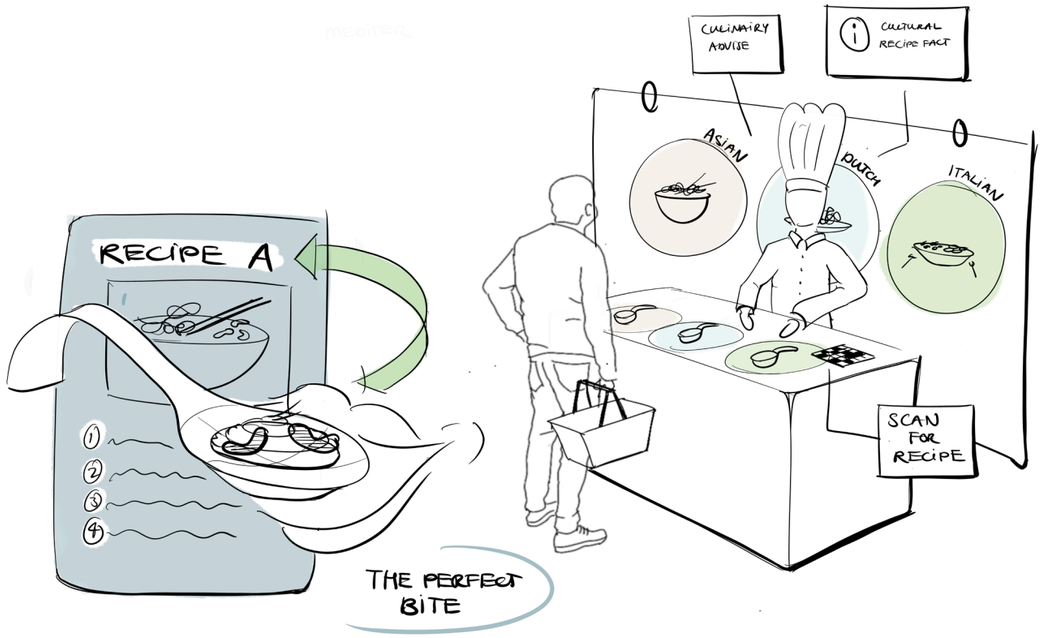
7-3 Two concepts

After evaluating the concept directions with the Flevo Campus team, the decision was made to merge them into two main concepts. The focus shifted away from promoting beans in concept 2 due to concerns that it might be perceived as repelling to consumers, potentially causing the opposite effect. There is a belief that solely changing the perception of beans through marketing strategies may not succeed. Therefore, the primary emphasis will be on introducing consumers to beans through recipes Consequently, direction 1 is further developed into concept 1: the bean tasting station. Concepts 3 and 4 are combined into concept 2: the recipe generator.

Concept 1: bean tasting station

The first concept addresses the hidden nature of canned beans in the supermarket with the idea that ‘unknown makes unloved’. This concept aims to reveal the appeal of beans in-store by providing an inspiring culinary experience that focuses on their flavour and aesthetics.

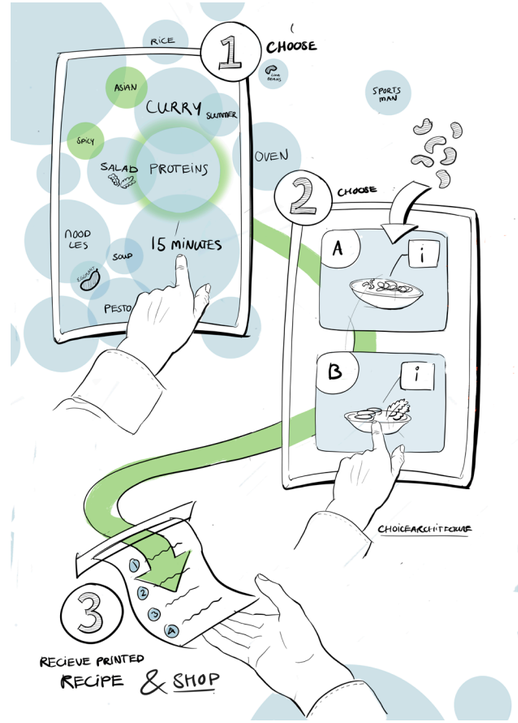
As hungry consumers enter the store, they encounter a taste buffet featuring “the perfect bite” – a single, flavorful sample paired with a simple recipe that includes beans. Additionally, information about the cultural origin of beans is provided, placing them within the world kitchen section, a popular area in the supermarket where the target group seeks in-store inspiration.

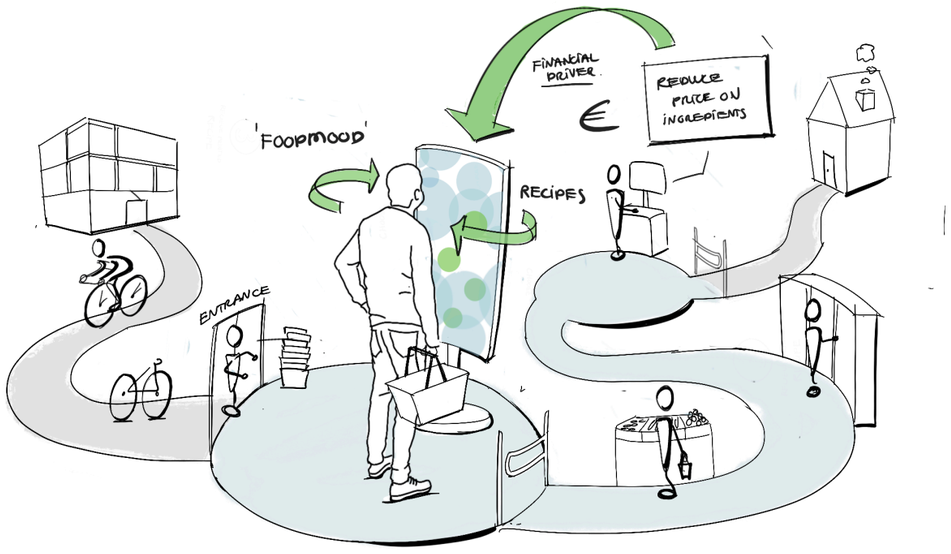


Concept 2 : recipe generator

The second concept features an interactive recipe generator designed to engage consumers who enter the supermarket without a dinner plan. This system is displayed on an interactive screen that prompts users to select a type of recipe and customise it by adjusting criteria such as cooking time or ingredients. Words and images float across the screen to engage and stimulate the user.

The recipe generator focuses on plant-based recipes that include beans and allows users to tailor their options to their preferences. By providing a limited set of curated recipe suggestions, the system simplifies the decision-making process and helps users make quick, satisfying meal choices through a clear choice architecture.





7-4 Concept selection

Concept selection

Both concepts were presented to the team at Flevo Campus. After the presentation, the team provided feedback from both the consumer's and the supermarket's perspectives, and evaluated the concepts through a Google Form. Based on this feedback session, combined with the concept selection method of Harris Profiles concept 2 was selected. Harris Profiles visually represent the strengths and weaknesses of design concepts, making it easy to quickly compare and select the best options (Van Boeijen et al., 2013).

Extra criteria

Based on the concept evaluation, two additional criteria emerged as important for further developing the recipe generator. From the supermarket's perspective, the ability to generate data is an interesting aspect to further look into. For the consumer, the experience should be (besides quick and low cognitive), enjoyable too. A playful interaction allows the consumer to select and compose their recipe positively, increasing the likelihood of repeated use.

Data collecting

The concept should provide the supermarket valuable data from the consumer.

Fun experience

The experience of the concept should be engaging and fun, incorporating elements of gamification.

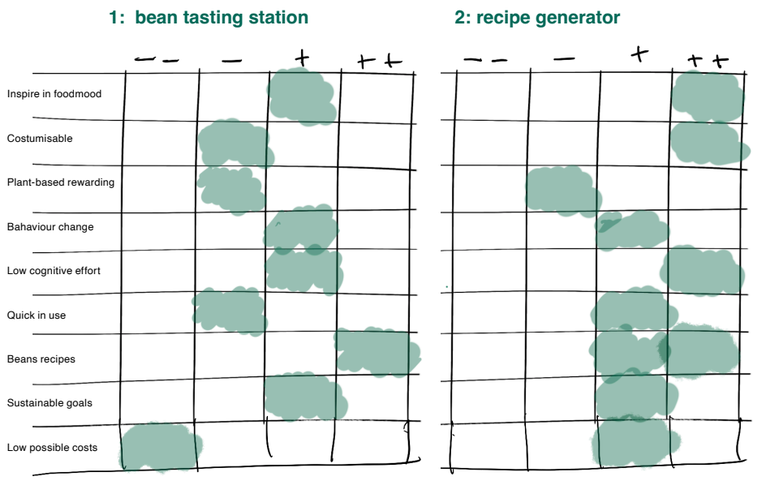


Figure 30: Harris Profile concept selection

Conclusions Chapter 7

During the ideation process, various sessions, including individual sketching and brainstorming with behaviour experts and the target group, generated numerous ideas. These ideas were evaluated and plotted on coordinate systems with design criteria, leading to four concept directions. These were further refined into two concepts: the bean tasting station and the recipe generator.

After evaluation by the Flevo Campus team and a comparative analysis using Harris Profiles, the recipe generator was selected. This concept features an interactive screen at the supermarket entrance that inspires consumers with plant-based recipes and allows for personalised selections. The evaluation highlighted two key criteria for further development: enhancing user enjoyment through gamification and ensuring the concept provides valuable data for supermarket stakeholders.

08 chapter

Concept development

This chapter outlines the evolution of the Protein Screen concept. Initially, a SCAMPER session was conducted to gather ideas and improvements in collaboration with the target group. Subsequently, the concept is detailed, focusing on two key areas for further enhancement: scenario development and screen design. The user scenario was refined based on feedback gathered from the SCAMPER method and presentation feedback. A simplified, testable version of the screen was developed in Figma and evaluated for usability.

8-1 SCAMPER method

Feedback from the Flevo Campus team revealed several development opportunities for the concept. To explore these, the SCAMPER method was used. This structured approach aids in identifying improvements and innovations, refining the concept based on the target group's insights and feedback.

Procedure and participants

- Participants: Six young adults, male and female, aged 22 to 30.
- Setting: In a private room around a big table.

To encourage creative thinking and help participants become comfortable with sketching, the session began with a game of Pictionary. Following this, the SCAMPER method was introduced and explained. SCAMPER is a systematic brainstorming technique that fosters innovation by examining a concept through seven distinct perspectives, as outlined below. Participants had 3 to 4 minutes to generate ideas for each SCAMPER category. Following this, a group discussion explored each category, leading to new insights that were documented for further development.

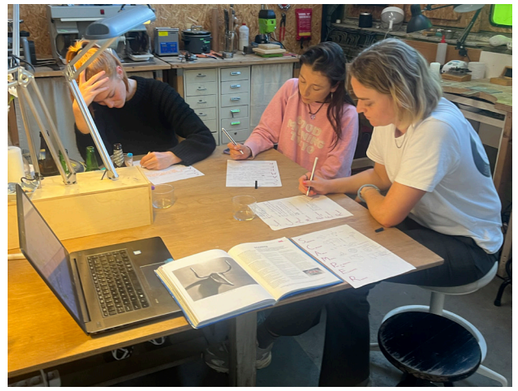


Figure 31: Testing set-up

Analysis

After the session, all participant input and additional ideas generated during the discussion were merged and structured into one screen to provide an overview. The paper was then evaluated with an orange pen to highlight the most interesting ideas as depicted below.

- **Substitute** What elements of the concept could be replaced?
- **Combine** How could different aspects be merged to create something new?
- **Adapt** What elements could be adjusted to better fit the context?
- **Modify** What changes can be made to improve the concept?
- **Put to Another Use** How could the concept be repurposed or used in a different way?
- **Eliminate** What could be removed to streamline or enhance the concept?
- **Reverse** What if the concept were approached from the opposite direction?

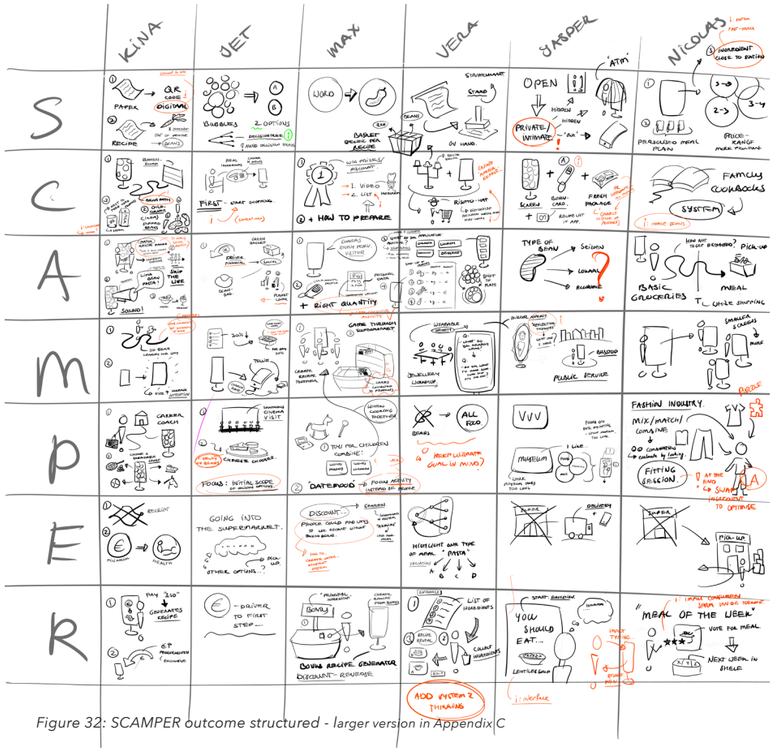


Figure 32: SCAMPER outcome structured - larger version in Appendix C

8-2 Scenario and screen development

User scenario development

Based on the SCAMPER method and feedback from the concept presentation, several alternative scenarios were stuctured, sketched and evaluated through conversations with the target group (see FigureXX). The key decisions are summarised below:

- Placement behind gates

The screen will be positioned just beyond the entrance gates, near the fresh vegetable and fruit station. This location is ideal because customers typically grab their baskets upon entering the supermarket and begin looking for inspiration right after passing through the small gates.

- Receiving recipe and ingredient information through an QR-code and printed version.

Both options, QR code and printed, will be available to increase flexibility, cater to different consumer preferences, and address the concern of poor internet connectivity in some supermarkets.

- Recipe themes will serve as the starting point on the screen

Unprepared consumers often ask themselves, “What do I feel like for dinner tonight?” They will use the screen primarily for inspiration and as a guide to start planning recipes. Therefore, the function of scanning ingredients after browsing through the fresh vegetable shelves is not desirable.

- Price and convenience options moved toward end of screen sequence

In the user scenario, convenience and low-cost recipe options are important. However, specific filters like “recipes under 4 euros” or “ready in 20 minutes” can be pushed to the end of the screen sequence, as users usually decide on their foodmood first.

- Connection to Albert Heijn account and personal bonus card

To simplify customizing recipes and increase the success of suggested recipes, the screen can scan personal accounts on the AH app and bonus card.

- Rewarding element

To encourage a repetive use of the concept, a rewarding system could be incorporated. This could include receiving a discount at the checkout or, in a more subtle approach, receiving a compliment.

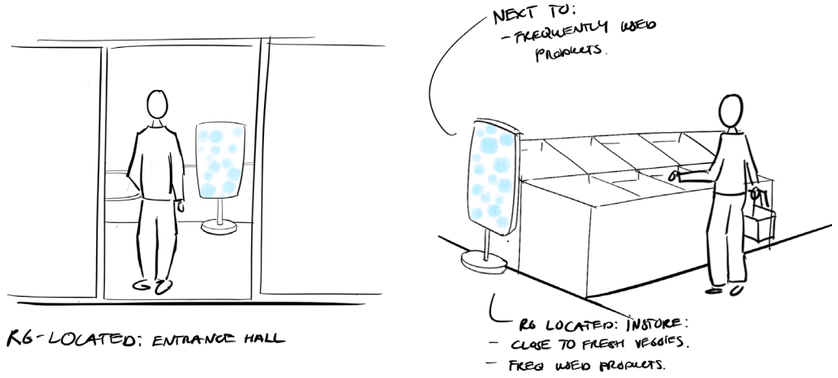


Figure 33: Scenario development sketch

Screen development

Through research on supermarkets and food delivery websites, numerous options and categories that influence consumers’ decisions have been identified. These categories are listed in an Excel sheet and applied to various screen sequences to design a choice architecture suitable for the user scenario. These decision options were sketches as a protoype.

Based on the design criteria and discussions with the Flevo Campus team on scenario development, the following choice architecture for the screen sequence was developed, as illustrated below. The screen is designed to streamline decision-making by presenting a limited set of options, thereby simplifying the decision making. After sketching multple diplay options, the information was translated to Figma for digital protoyping as illustrated in Figure 34.

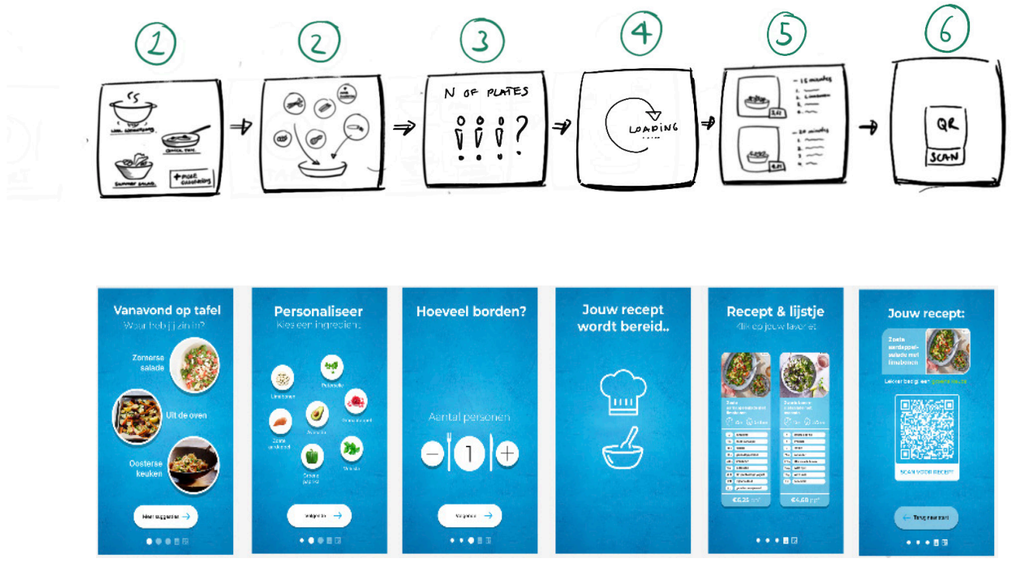


Figure 34: Screen sequence from sketch to digital.

8-3 Proof of Concept

After creating the digital prototype, a Proof of Concept (PoC) was conducted. This crucial step tests the feasibility and potential success of the product. The primary aim of the prototype test is to assess the usability and comprehensiveness of the information displayed on the screen with the intented users. By doing so, it helps in designing effective, ensuring that the product meets user needs and expectations. Additionally, a PoC provides a practical demonstration of the product's value, showcasing its functionality and potential impact in a tangible way. This approach helps in identifying issues before testing the concept in the supermarket context.

Procedure and participants

- Participants: Eight colleagues from Flevo Campus, aged 22 to 60.
- Setting: A private room with a touch screen installed on the wall.

Participants were asked to imagine entering a supermarket without a cooking plan or grocery list. They interacted with the screen while thinking aloud, providing initial impressions and feedback. After this initial exploration, we reviewed the screens again to evaluate specific steps and collect more detailed feedback.

Limitations

- Some participants were already familiar with certain functionalities of the screen before testing, which might have influenced their interactions and feedback.
- The age range of participants included individuals older than the target demographic, which could affect the relevance and applicability of their feedback to the intended user group.
- The test was conducted in a controlled environment rather than a real supermarket, which may not fully replicate the actual shopping experience and context in which the screen would be used.

Data analysis

All valuable comments were written down and structured in feedback per screen and general feedback.

Insights

User interaction and usability

- Multiple ingredient selection: Users should be able to select multiple ingredients at once rather than just one.
- Smooth touchscreen operation: The touchscreen must function smoothly to avoid user frustration.
- Navigation flexibility: Users should be able to easily navigate back and forth to correct mistakes.
- Enhanced guidance: Screen 5 should clearly direct users to the next step, and clickable buttons should be highlighted for better guidance.

Content and functionality

- Additional suggestions: If the initial screen does not present the desired options, the system should offer more suggestions.
- Simplified information: The information provided when choosing between recipes should be simplified.
- Ingredient categorisation: Ingredients should be categorised according to their availability in the supermarket.
- Recipe adaptation: Recipe directions could focus more on flavours rather than just recipe themes and specific ingredients.
- Recipe modification: Respondents expressed a desire to adapt the recipes offered by the screen, such as by adding or removing ingredients.
- App integration: Certain functionalities, such as notifying users about ingredients they are likely to have at home, could be incorporated into the Albert Heijn app. This approach helps to avoid overcrowding the screen with too much information.

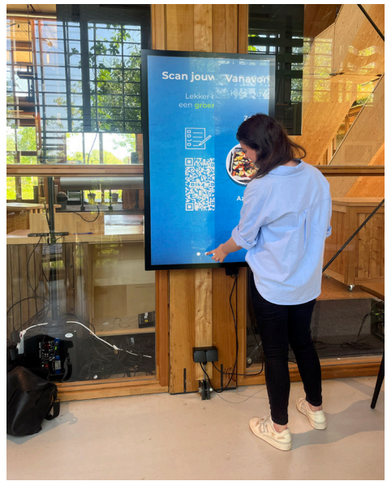


Figure 35: PoC testing set-up

Conclusions Chapter 8

This chapter details the development of the protein screen concept. Initial SCAMPER sessions with the target group generated ideas and highlighted improvements, which were used to refine the user scenario and screen design. Key design decisions included positioning the screen near the entrance, providing both QR codes and printed recipes, and emphasizing recipe themes over ingredient scanning. Price and convenience options were shifted to later in the sequence, and personalisation through Albert Heijn accounts was incorporated. The chapter offers valuable insights for iterating the final concept and refining the pilot test in preparation for the MVP test.

09 chapter | Final concept

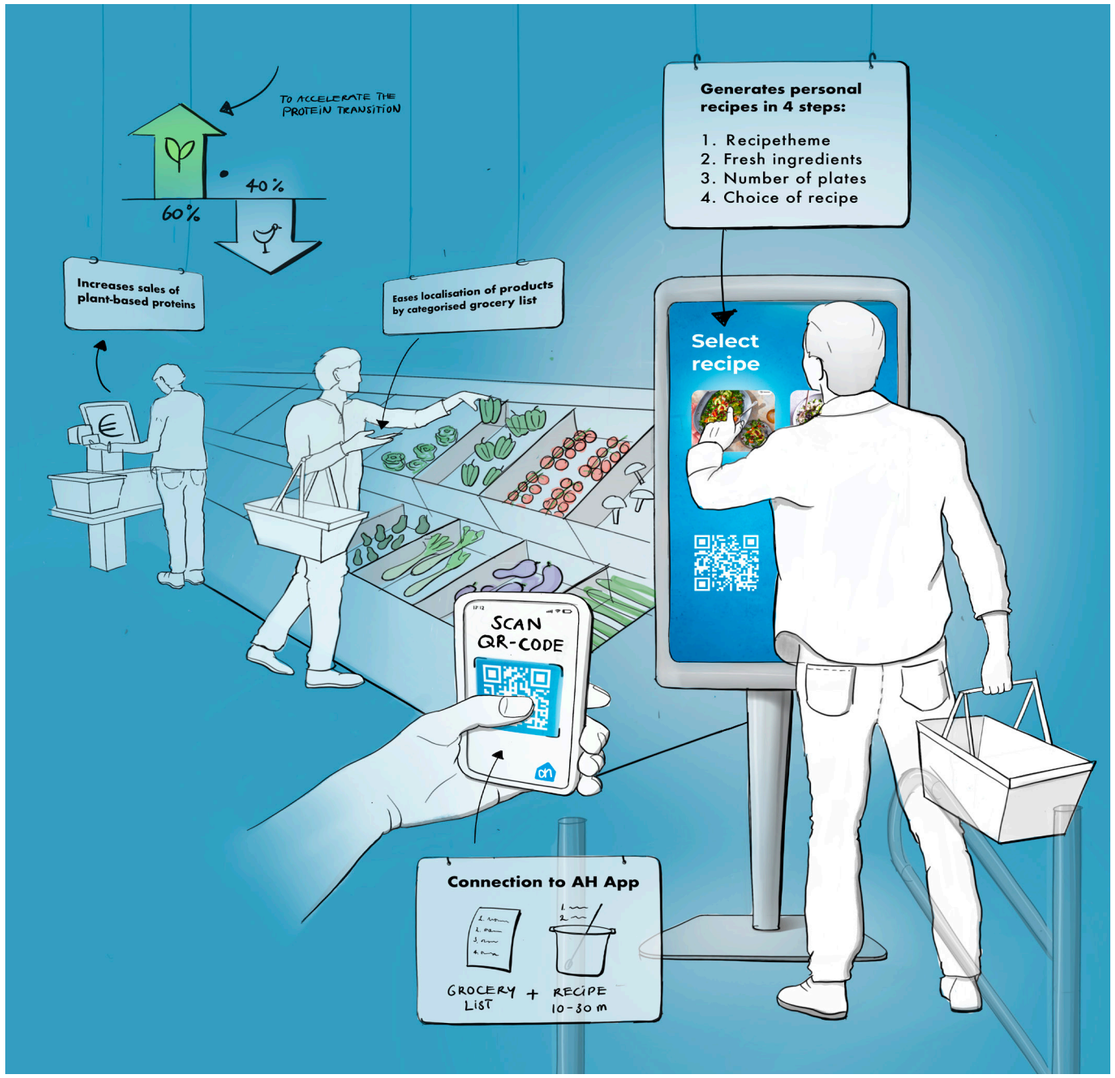
This chapter provides an elaborate overview of the final concept, detailing its core functions and context. It begins with a user scenario to demonstrate how the concept operates and interacts with users. Next, the chapter assesses the concept's desirability, feasibility, and viability. Finally, it concludes with an evaluation of the concept's impact at the micro, macro, and meso levels.

9-1 Protein Screen

The Protein Screen answers the shopper's question, "What am I having for dinner tonight?" with a plant-based suggestion as soon as they enter the store. The interactive screen guides the hungry shopper through four simple steps toward a personalised recipe. First, it inspires users with appealing recipe images to help them decide what type of food they're in the mood for. Next, users select a few fresh ingredients and the number of servings they need. After comparing two recipes based on ingredients, images, nutritional values and price, the user scans a QR code to receive the recipe on their phone along with a categorised shopping list. This makes it easier to locate ingredients and follow cooking instructions at home.

The concept fits the busy lifestyles of young adults and reduces decision-making after a long day. For Albert Heijn, this product serves as a practical tool to help achieve their sustainability goal of increasing plant-based protein sales to 60%.

The Protein Screen uses 'Silent Steering' to subtly nudge users toward plant-based recipes by leveraging unconscious behavior. It also employs 'Gentle Guidance' by providing clear plant-based recipes with ingredients and instructions, enhancing users' cooking skills. This combination of nudging and practical support effectively promotes sustainable dietary changes.



9-2 User scenario

The following user scenario demonstrates the concepts appeal. The narrative presents the design within its contextual usage, providing a timeline from the user's perspective.

1 After finishing work, Jonas cycles to the supermarket for to buy an evening meal. He hurries because he wants to get home as soon as possible.

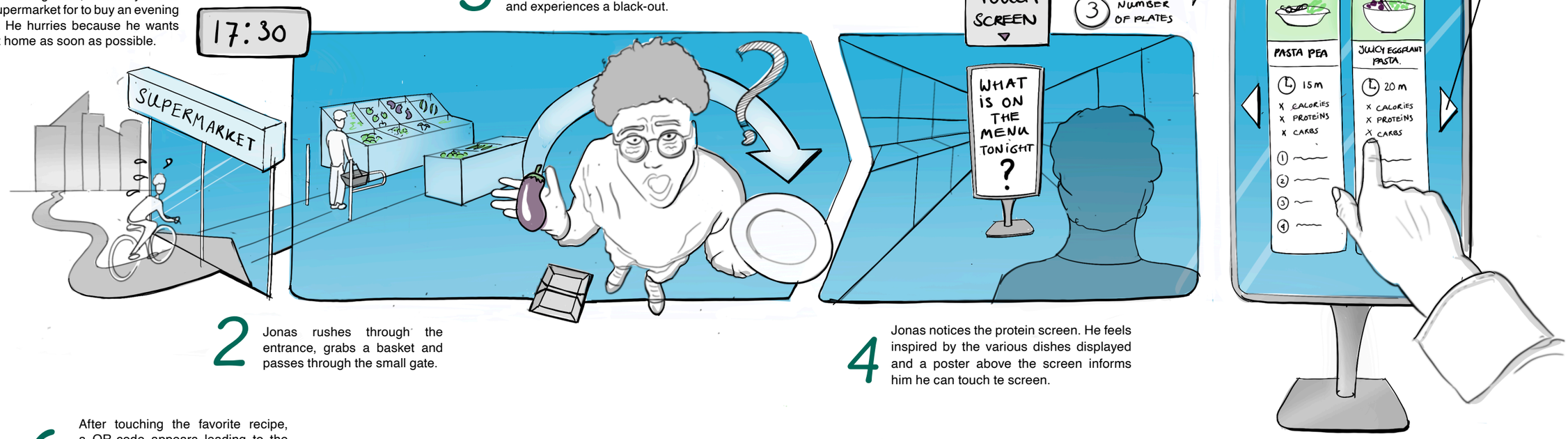
2 Jonas rushes through the entrance, grabs a basket and passes through the small gate.

3 Jonas wants to make a tasty, quick, and nutritious plant-based recipe but feels uninspired and uncapable and experiences a black-out.

4 Jonas notices the protein screen. He feels inspired by the various dishes displayed and a poster above the screen informs him he can touch te screen.

5 Through 3 simple steps, the protein screen guides Jonas towards two costumised generated recipes. Jonas compares the recipe by image, title, cooking time, nutritional value: calories, protein, carbs and ingredients and choses a recipe and price.

If the suggested recipes are not appealing to Jonas, the screen generates additional options using the swipe function.

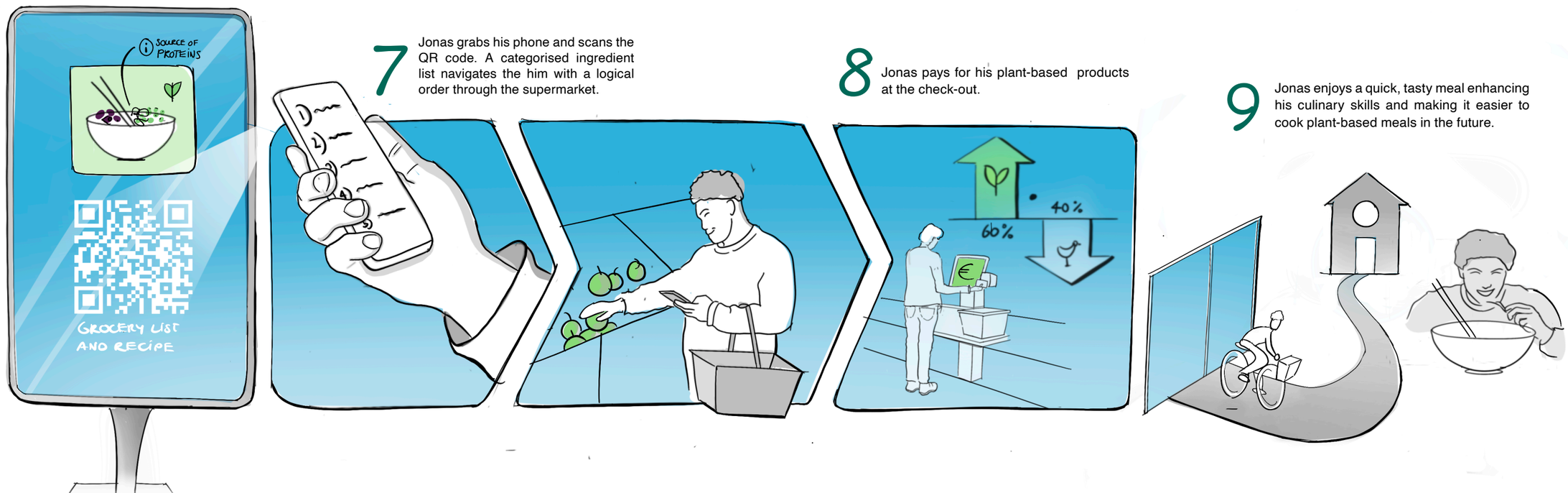


6 After touching the favorite recipe, a QR-code appears leading to the AH website or application for the ingredient list and recipe.

7 Jonas grabs his phone and scans the QR code. A categorised ingredient list navigates the him with a logical order through the supermarket.

8 Jonas pays for his plant-based products at the check-out.

9 Jonas enjoys a quick, tasty meal enhancing his culinary skills and making it easier to cook plant-based meals in the future.



9-3 Desirability

The concept needs to address the values and needs of consumer, the Abert Heijn and Flevo Campus.

Consumer

What's for dinner tonight?

The daily issue for young adults is deciding ' What's for dinner tonight?'. Instead of wandering the supermarket trying to decide on what to eat, the Protein Screen captures their attention with an informative banner hanging above the screen to explain the function and its first display by suggesting three recipe themes. Each option is accompanied by a tempting image, inspiring consumers and helping them define their foodmood.

Figure 35:Banner design to inform the consumer.

Decision-making process

The protein screen simplifies decision-making for tired shoppers through several key design elements. First, it centralises the starting point, preventing aimless wandering around the supermarket. Second, it breaks down the decision making process into four simple steps. Through a screen sequence with a clear choice architecture the user is guided users towards a recipe match. Lastly, it displays only a few options at a time, with a "more suggestions" button for additional choices if needed.

Novelty and familiarity

The target group enjoys experimenting with new recipes, but on a casual Tuesday night, they aren't looking for unfamiliar ingredients. The protein screen strikes a balance by offering recipes that incorporate familiar ingredientsm, while still introducing a slight twist to keep the meal interesting and novel.

Stay curious

The protein screen's digital display updates weekly to inspire consumers with new suggestions. This adaptability allows it to feature seasonal ingredients and current food trends, keeping meal options fresh and exciting. For example, on a very cold day, the screen might suggest "stamppot," while on a hot summer day, it could offer "vegetarian BBQ" recipes. This keeps users curious about what the screen will offer next.

Enjoyable experience

Interacting with a large, visually pleasing screen provides an enjoyable and playful shopping experience. Moving elements like arrows with "touch button" icons guide users on how to interact with the screen. Banners with informative text such as "generate your recipe in one minute" clearly communicate the screen's purpose and meet the needs of hurried consumers.

Albert Heijn application

83% percent of AH consumers use the supermarket application for various functions. Building on the user scenario from the previous page, the AH app connects with the protein screen before starting recipe selection. This integration allows the app to personalise recipe suggestions based on users' previously rated and saved recipes.

Albert Heijn

Consumer data

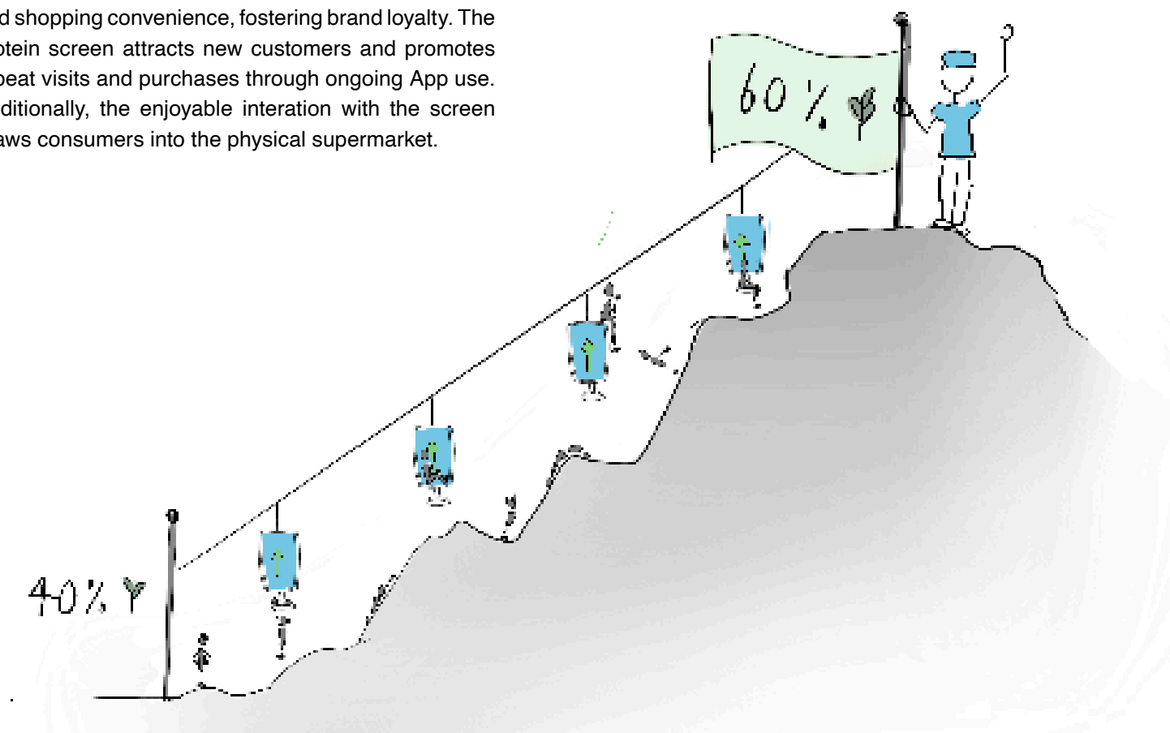
Consumer data is essential for supermarkets to understand and serve their customers effectively. This data helps personalise marketing efforts, optimise inventory management, and make informed decisions about pricing, product assortment, and store layout. Through the touches on the screen, valueable in-store data can be collected through the protein screen. This generated data could also be used to improve the screen's functionality.

Plant-based protein goal

The Protein Screen helps Albert Heijn reach its goal of having 50% of the proteins sold be plant-based by 2025 and 60% by 2030. As more supermarkets set similar targets, using the Protein Screen could enable Albert Heijn to achieve the 60/40 ratio ahead of competitors, strengthening its green image and leading the market.

Custumer loyalty

The protein screen enhances customer loyalty for the supermarket by connecting to the AH application. At the end of screen interaction, customers scan a QR code that directs them to the Albert Heijn app or website to access their chosen recipe. This interaction introduces them to Albert Heijn's extensive recipe database and encourages them to download the app for more recipes and shopping convenience, fostering brand loyalty. The protein screen attracts new customers and promotes repeat visits and purchases through ongoing App use. Additionally, the enjoyable interation with the screen draws consumers into the physical supermarket.



Flevo Campus

User-centered food innovation

Flevo Campus promotes healthy and sustainable food innovations for a better future, viewing citizens as active participants rather than passive consumers. The protein screen aligns with their mission by actively involving consumers in the transition on a micro level.

Collaboration

Flevo Campus is eager to collaborate with key stakeholders in the food industry, like supermarkets, to promote sustainable food transitions. The protein screen provides an opportunity for partnership with Albert Heijn or other supermarkets to further develop the potential of the concept.

Income potential

Currently, the institution is financially dependent on the municipality of Almere. However, the protein screen concept has the potential to generate income through partnerships with brands offering plant-based products, such as HAK, BOON, and Vezet.

9-4 Feasibility

To effectively implement the Protein Screen, Flevo Campus needs to collaborate with supermarkets. Before the concept can be implemented in-store, several research and development steps must be completed. The illustration below outlines the product maturity stages, detailing the tests already conducted in the timeframe of this thesis and proposing three additional development phases before in-store implementation.

The roadmap is specifically tailored for collaboration with Albert Heijn, aligning the concept with their logistical framework and target audience. Throughout the design project, BUN, the operator of multiple Albert Heijn supermarkets, has been involved to facilitate test locations. After the research deadline, a meeting with Albert Heijn's central team is planned to discuss potential partnerships and broader testing opportunities.

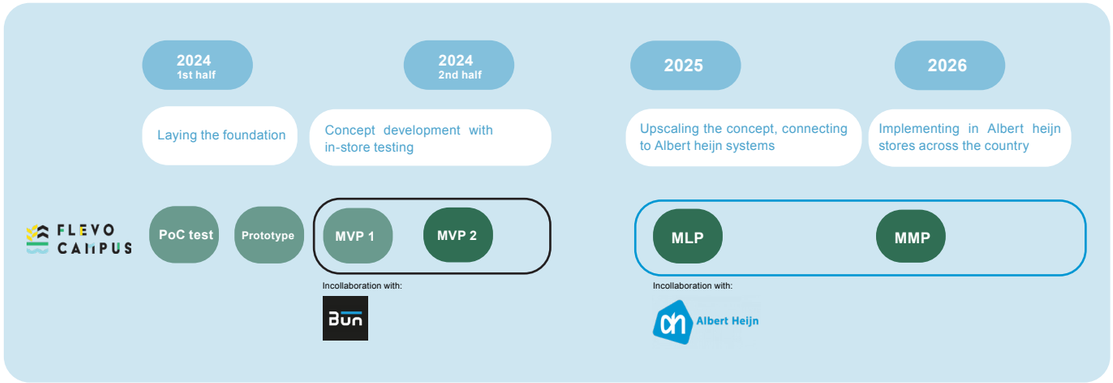


Figure 36 Road to implementation

Stakeholders

The development and implementation of the Protein Screen involve several key stakeholders, each with specific roles.

Flevo Campus

Flevo Campus oversees the design and testing phases, applying their expertise in design interventions and user-centered research to refine the concept and conduct further research on plant-based food consumption.

Supermarket

The supermarket provides essential infrastructure and logistics for the Product-Service System. This includes integrating the screen with store operations, supplying data for recipe suggestions, managing inventory for featured ingredients, and maintaining screen functionality.

Plant-Based brands and producers

Food brands such as BOON, HAK and Vezet can play a role in the concept by featuring their products in the recipe suggestions provided by the protein screen.

Collaboration

Albert Heijn

Albert Heijn was selected for this design project because they are the most popular supermarket among the target group and can create a significant sustainable impact due to their 37.1% market share in the Netherlands in 2023 (Van Rompaey, 2024). The concept is tailored for Albert Heijn, incorporating features like their personal Bonus Card and their extensive online recipe database, which includes over 22000 recipes, of which 5200 are plant-based.

Other supermarket

Implementing the protein screen across various supermarkets would support the protein transition on a national level. Starting with a single supermarket can streamline the implementation process, benefiting both Flevo Campus and the supermarket. However, partnering with multiple supermarkets enhances impartiality and underscores that the collaboration is driven by Flevo Campus sustainable goals.

When expanding to additional supermarkets or starting with new ones, several factors must be considered. Each supermarket differs in sustainability strategies, target audiences, floor plans, marketing and branding, geographic locations, and product offerings. By taking these differences into account, the protein screen can be more effectively tailored and implemented to meet the specific needs of each supermarket. Additionally, it is beneficial to incorporate the system in supermarkets that offer certain features, such as an extensive online recipe collection and the option for personal online accounts.

This paragraph evaluates two alternative supermarkets for the Protein Screen: Jumbo, which aligns well with Albert Heijn in terms of audience and digital features, and Dirk, which presents challenges due to its focus on lower-income shoppers and limited online resources.

Jumbo

The most suitable alternative to Albert Heijn for implementing the protein screen is Jumbo. This supermarket resembles Albert Heijn in terms of geographic locations, target audience, and online features. Jumbo's acquisition of Smulweb allows them to offer a vast collection of 390,000 recipes, although this may sometimes favour quantity over quality. They aim for 60% of the proteins sold by 2050. This alignment makes Jumbo a promising partner for promoting plant-based food consumption through the protein screen.

Dirk

Implementing the Protein Screen at Dirk, a supermarket targeting lower-income shoppers, would be challenging and require significant adaptations. Research is needed to understand Dirk's customers, whose dietary needs and purchasing habits may differ resulting in a different user scenario. Additionally, Dirk lacks features such as an extensive online recipe database, particularly for plant-based options, complicating the integration of the Protein Screen service system.

9-5 Viability

The design needs to be able to survive on a longer term. This paragraph outlines its viability.

Incorporation food management

When the screen has been in the store for a while, users naturally incorporate its use into their supermarket visit routine. Instead of stressing about meal decisions during the bike ride or scrolling through TikTok at work for recipe inspiration, customers trust that they will find a recipe match in-store with the help of the protein screen. This tool becomes a seamless part of their food management routine.

AI recipe generation

An AI tool could generate recipes using store products, allowing the supermarket's product system to go beyond its own recipes. This way, the supermarket doesn't need to develop recipes in-house

What about lunch?

The user scenario of the protein screen is focussed on evening meal, however it could offer its inspiration and guidance for meals too. Offering users options right from the initial screen: breakfast, lunch and dinner as depicted on the screen below. Lunch, in particular, presents an interesting opportunity since Dutch lunches often include animal-based proteins like cheese and ham.

Figure 37: Breakfast, lunch, dinner

Adaptable

As mentioned in 9-3, the digital display of the protein screen updates weekly to inspire consumers with new suggestions, keeping them curious about what the screen will offer next. This adaptability lets the screen feature seasonal ingredients and current trends, keeping meal options fresh and exciting. For instance, it might suggest 'stamppot' on cold days or orange-themed recipes for Kings Day. For example, on a very cold day, the screen might suggest 'stamppot,' while on the national Kings Day, it could offer recipes with orange ingredients.

From sustainabilty to health

This design project primarily aims to promote sustainable consumption behaviour but also offers opportunities to encourage healthy eating habits. Both goals could be achieved by plant-based diets, though designing for health requires a distinct approach. Making health the primary focus for the recipe generator involves engaging health experts and conducting consumer research to understand consumer needs and preferences regarding healthy food. Additionally, understanding how the supermarket environment can promote healthier diets will help establish design criteria for a health-focused approach.

Beyond supermarkets

The Protein Screen can promote sustainable decision-making by highlighting plant-based options in various food-related contexts, including fast-food restaurants and canteens. In fast-food chains like McDonald's, interactive screens are used to streamline the ordering process. By incorporating features from the Protein Screen, these screens could also be designed to guide consumers towards plant-based food choices, enhancing both efficiency and sustainability.

Another context could be a school canteen. A Flevo Campus project is helping VMBO students make healthier choices in their school canteens. Installing a screen in the canteen could engage students by steering them towards more healtier options, rather than defaulting to less healthy choices like fries. This environment presents a interesting opportunity to incorporate gamification into the design, creating an engaging and enjoyable experience that encourages teenagers to choose plant-based meals.

9-6 Micro, meso, macro

The concept aids the protein transition by impacting environmental sustainability, retail dynamics, and individual dietary choices. This paragraph evaluates the concept's influence across three societal levels, macro, meso, and micro, to understand its broader impact.

Micro level

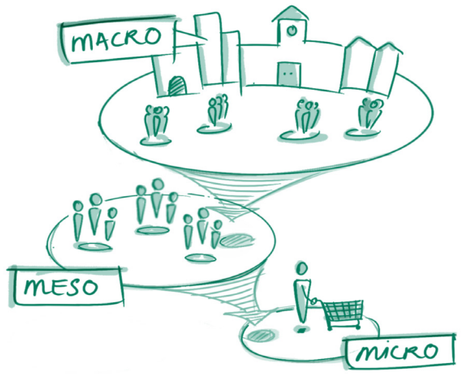
- The screen simplifies the decision-making process for shoppers by presenting appealing plant-based recipes.
- Consumers can gain inspiration and develop skills for plant-based cooking by preparing the recipes suggested by the Protein Screen.

Meso level

- Supermarkets can see a rise in the sales of plant-based products as the screen guides consumers toward these options.
- Shifts in consumer demand towards plant-based proteins can affect local economies, influencing product supply chains and market trends.

Macro level

- By promoting plant-based recipes, the screen supports global efforts to reduce the environmental footprint of animal agriculture.
- The screen can support a cultural shift towards plant-based eating, supporting the protein transition.



Conclusions Chapter 9

The Protein Screen is an innovative in-store intervention designed to inspire, stimulate, and guide young adults toward plant-based recipes. By incorporating engaging visuals, easy-to-follow steps, and personalised meal suggestions, the screen effectively supports plant-based eating habits. Its impact spans across micro, meso and macro levels of the food system, promoting broader adoption of plant-based diets.

For Albert Heijn, the Protein Screen aligns with their sustainability goals, particularly the aim to increase plant-based protein consumption to 60%. It offers a practical tool for engaging customers, enhancing their shopping experience, and driving sales of plant-based products.

For Flevo Campus, the intervention opens doors for further research into in-store plant-based food consumption and potential collaborations with supermarkets, advancing the transition toward more sustainable food practices.

10 chapter | Validation

This chapter documents the results of the validation by the Minimum Viable Product (MVP) test. This validation technique is focussed on the consumer stakeholder. Some features described in the final concept in Chapter 9 are based on the tests conducted in this chapter. These features, along with potential future improvements, will be discussed here.
This validation aims to achieve two goals:

1. Evaluate Effectiveness: Determine if the design stimulates the target behaviour of chosing plant-based recipes.
2. Identify challenges: Gain insights to identify challenges and how to make the design more effective and appropriate.

10-1 Approach

A Minimum Viable Product (MVP) focuses on essential features to collect user feedback with minimal investment. This approach tests core functionalities to understand user interactions and preferences, allowing for refinement of the concept based on real feedback. Because the user scenario in the supermarket strongly influences how intended users act with the concept, it was essential to test the MVP in its actual retail environment. The MVP testing covered steps 4 through 7 of the user scenario outlined in section 9-2. The MVP display sequence follows the choice architecture shown in Figure A below and detailed in Appendix E. All the suggested plant-based recipes include beans.

Figure 39: Test set-up at the Albert Heijn

Procedure and respondents

- Setup: In-store at Albert Heijn Columbuskwarier, the screen was positioned just past the entrance gates and tested on two weekday afternoons from 16:00 to 20:00, assuming this time best matches the target group's user scenario
- Respondents: 42 in total, both male and female.

Approach

The objective of the test is to test the effectiveness of the concept by answering to following questions:

- **Did the Protein Screen simplify the decision-making process of consumers?**
- **Did the Protein Screen stimulate the consumer to use it?**
- **Does the Protein Screen stimulate the consumer to make plant-based recipes with beans?**

These research questions are addressed through qualitative data collected from two methods: short interviews and Fly on the wall observations.

1. Short interviews

For 6 hours in total, costomers were approached with the question asking if they would like to use the screen for recipe inspiration. After using the screen, we asked the participants the following questions:

1. Did the Protein Screen help you choose a recipe? Please explain why or why not.
2. Are you going to buy the ingredients and make the recipe? Please explain why or why not.
3. Did the screen encourage you to cook with beans tonight? Please explain why or why not.
4. Did you find the screen pleasant to use? Please explain why or why not.

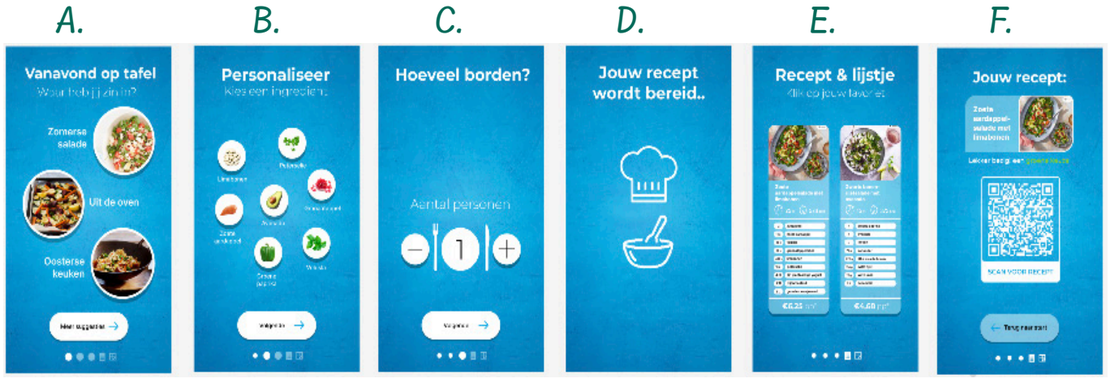


Figure 38: MVP screen sequence

2. Fly on the wall observations

For one hour in total, the fly-on-the-wall method was used to observe how consumers interacted with the screen without actively approaching the participants and explaining the function of the screen. Observations were documented to note whether and how consumers engaged with the screen.

Data analysis

All responses were digitised and structured per question, as detailed in Appendix D. Common and interesting responses were categorised into different themes and used for validation of the concept and translated to recommandations for futher development. Practical improvements on the usability of the screen are categorised per screen.

Limitations

- Most participants had already planned their meals before encountering the Protein Screen, limiting its influence on their decisions.
- The demographic information of the respondents was not recorded to keep the interviews accessible, which complicates drawing conclusions for the target audience.

Figure 40: Participant during MVP test

9-2 Results

1. Evaluation of effectiveness

Most of the participants, especially the intended target group, responded with curiosity and enthusiasm to the MVP pilot. The following paragraph evaluates the effectiveness and identifies areas for improvement.

- **Did the Protein Screen simplify the decision-making process of consumers?**

Based on the feedback from the MVP test on question 1, 2 and 3, the Protein Screen significantly aided the decision-making process for many participants. For those who typically lack meal inspiration and struggle to decide on a recipe after work, the screen offered a quick and efficient solution. Most participants found it helpful in discovering new recipes and gaining inspiration they wouldn't have thought of on their own. Also they indicated they would like to try their suggested recipe. This suggests that the screen effectively supports users who enter the store without a clear meal plan. Moreover, users appreciated the screen's intuitive design and quick access to recipes. The ability to see the list of ingredients and photos of recipes were helpful features in making decisions.

"I'm quite surprised by this recipe. It's not something I would make quickly myself, but I'm curious to try it". - Participant 10

"I often shop without a meal plan after work, this screen offers quick inspiration." - Participant 4

"It was easy and very quick, very chill if this would be in the supermarket. It would be a good help for people" - Participant 17

- **Did the Protein Screen stimulate the consumer to use it?**

Based on the observations by the Fly on the Wall method, it became clear that the protein screen did not evoke enough attention and understanding. The consumer probably perceived the new screen in their supermarket as an advertisement screen, not knowing they could touch it or the objective of the screen. In one hour only two users touched the screen. For the screen to be effective, this is an important element to improve.

- **Does the Protein Screen stimulate the consumer to make plant-based recipes with beans?**

Based on the feedback, the screen did not significantly encourage most participants to cook with legumes, as many either didn't notice the legumes in the recipes or already used them regularly. However, some participants did notice the legumes and felt motivated to incorporate them more into their meals. A few participants who typically don't cook with legumes mentioned that the screen might inspire them to do so in the future. As a result, it has been decided to include other protein rich sources in the suggested recipes, not just beans.

"If I make the recipe, it would be the first time I ate beans in a while". Participant 25

2. Identify challenges

The MVP test identified several key areas for improvement in the Protein Screen. Ingredient preferences played a significant role, with many users expressing dislike for specific ingredients, making it difficult for them to find a recipe match. Additionally, those with pre-existing meal plans or dietary restrictions, such as allergens, were less influenced by the screen's suggestions. The screen also faced challenges in inspiring users, as some participants did not find the recipes appealing or convincing enough to try. Lastly, there were suggestions for better integration with existing tools like the Albert Heijn app and improvements in the variety of vegetarian and vegan options offered. These and other insights are used to iterate on the final concept or recommandation for further research.

-

9-3 Stakeholders

Flevo Campus

Flevo Campus expressed their interest in further developing the concept and published an article on their website about the concept and testing procedure, stating the following:

“What I find great about the research is that not only the intervention is developped, but also tested the right away. This fits perfectly with Flevo Campus, where action research is highly valued”. - Thera van Heuveln, leader of the Supermarket of the Future project at Flevo Campus.

Albert Heijn

Albert Heijn BUN also sees value in collaborating with Flevo Campus to develop the Protein Screen, as highlighted in a LinkedIn post, which mentioned:

‘We are happy to help Flevo Campus and looking forward to the next steps’ - BUN

Society

Other organizations, such as Distrifood, a platform for the food industry, and Almere Zaken, the local newspaper of Almere, have published articles about the concept. This demonstrates the concept’s relevance and societal interest in the concept.

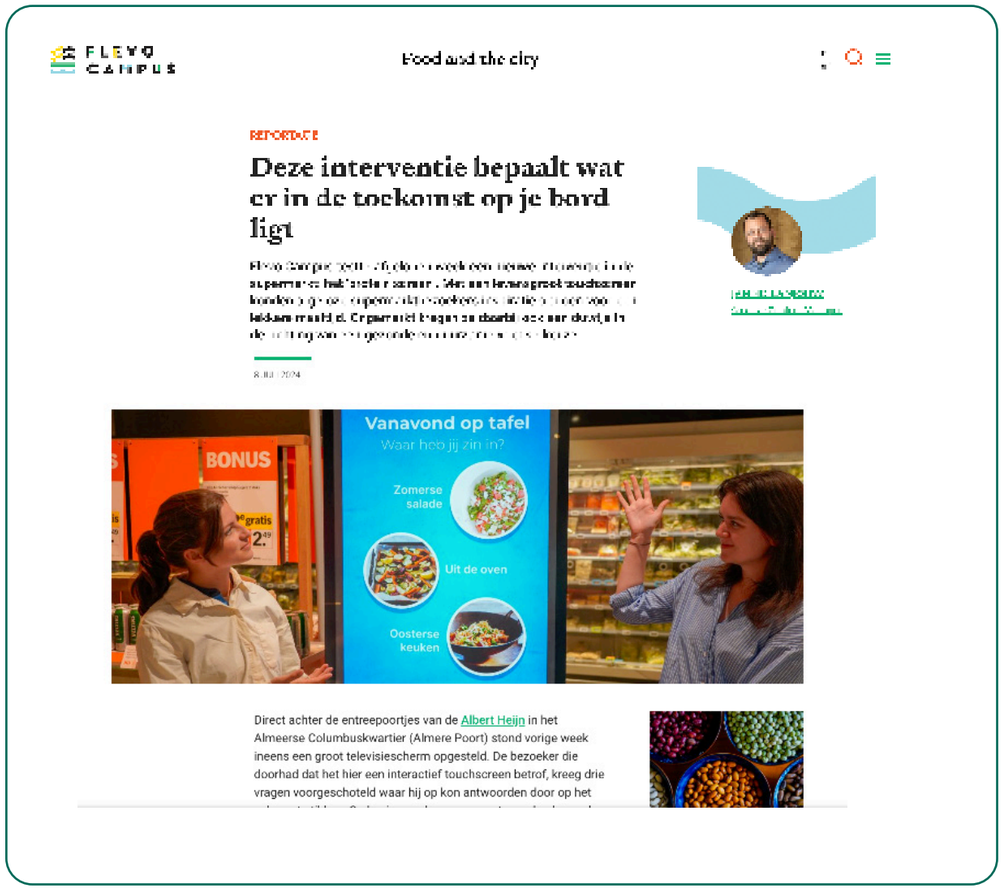


Figure 40: Article by Flevo Campus

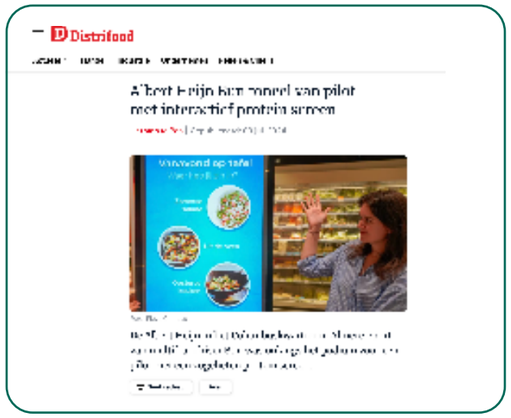


Figure 41: Article by Distrifood

Figure 41: Article by Almere Zaken

Figure 41: Article by BUN

Conclusions Chapter 10

The MVP test for the Protein Screen yielded valuable insights into its effectiveness and areas for improvement. While many participants, especially those without pre-planned meals, found the screen helpful in making quick dinner decisions and discovering new recipes. Also challenges were identified. The screen’s visibility and appeal in the supermarket environment, as well as its ability to integrate with existing tools like the Albert Heijn app, were highlighted as areas needing enhancement. Despite these challenges, the positive response from users and the interest from Flevo Campus and Albert Heijn indicate potential for further development and broader implementation of the concept.

E
section

Discussion

This section brings together and discusses the insights from the research and design phases, offering a comprehensive reflection on the project's outcomes. The first chapter identifies limitations of the reserach. Additionally, the chapter provides recommendations for future research and development, aiming to further refine and enhance the concept's potential.

11 chapter | Limitations and recommandations

In this final chapter, the limitations of the final concept and research will be discussed, followed by recommendations for further research and concept improvement. The chapter will then reflect on the project process, concluding with a summary and a personal reflection on the project.

11-1 Limitations

Long-term behaviour change

The first limitation of the concept is its uncertainty about the long-term impact on eating patterns. The concept assumes that offering personalised plant-based recipes will improve users' skills in preparing these meals. According to the COM-B model, capability involves the skills and knowledge necessary for behaviour change. While the intervention may inspire users and promote sustainable recipe choices, it is unclear whether it provides enough skill development for long-term behaviour change.

Effectiveness in numbers

Secondly, a thorough evaluation of the intervention's effectiveness was not feasible within this project. Although in-store test showed positive reactions, the research did not measure the impact of the protein screen on the ratio of plant-based to animal proteins sold in the supermarket in numbers, leaving this outcome qualitatively unassessed. This could be addressed with an MLP test in collaboration with the supermarket, as outlined in the implementation roadmap in Chapter 9-3.

Autonomous usage

Additionally, the research is limited in validating the concept's effectiveness for autonomous use. After the MVP test, the final concept was revised to include visually appealing elements like banners and moving graphics. However, it remains unclear whether these features alone are enough to encourage users to use the interactive screen independently in the supermarket and maintain their engagement over time.

Food waste

The concept currently lacks features to address food waste, which is an important aspect of sustainable food consumption. Future research could explore ways to incorporate leftover ingredients or products that consumers already have at home. The current design does not include this functionality because it focuses on the scenario of users entering the supermarket unprepared. However, expanding this scenario to allow users to select recipes based on ingredients they already have could enhance the concept's effectiveness in reducing food waste.

Concept costs

A limitation of the research is the uncertainty surrounding the development, implementation and maintenance costs of the Protein Screen. The project lacked a comprehensive cost analysis, making it difficult to assess the financial feasibility of the intervention.

Inclusive design

The Protein Screen concept is limited in its ability to address diverse dietary needs and allergies. During the MVP test, it became clear that users are very particular about their recipe choices, highlighting challenges in accommodating a wide range of dietary preferences and restrictions. Adding options to filter ingredients and accommodate dietary needs could significantly improve user satisfaction and engagement.

The Protein Screen is limited in addressing the needs of meat-centered consumers. While including this group could significantly support the concept's sustainability goals, the current design focuses exclusively on plant-based recipes. To effectively engage meat-centered consumers and encourage reduced meat consumption, alternative strategies should be considered. For example, the screen could offer recipes that incorporate small amounts of meat, such as toppings with a small amount of bacon, alongside plant-based options.

12-2 Recommendations

UX Design
The design offers significant potential for gamification, which could further increase user engagement. For instance, instead of simply clicking on ingredients, users could swipe ingredients towards a plate, creating a more playful and interactive experience. A/B testing on the digital user experience (UX) is essential/ Collaborating with UX experts can help refine the design to be more intuitive and enjoyable.

Hardware
Exploring different types of screens in terms of size, shape, and touch interaction could improve usability. Assessing various options and selecting the most effective one can enhance the user experience. To attract users to start using the protein screen, various attention-grabbing methods such as banners could be explored. Further research could improve the overall look and feel of the hardware.

Recipe match
Ensuring a successful recipe match between the protein screen and the consumer is crucial. Using familiar and popular ingredients, collaborating with chefs to create appealing recipes, and offering more recipe options on screen can improve the chances of a successful match. Additionally, offering more parameters as input and increasing the variation between ingredients can lead to better recipe match outputs.

Discount
To enhance the appeal and effectiveness of the Protein Screen, consider integrating it with the supermarket's discount section. Insights from field research and and MVP test reveal that many users base their meal choices on discounted items. By positioning the Protein Screen near the discount area and showcasing recipes that feature these discounted products, the concept could better align with shoppers' purchasing habits.

Privacy
The protein screen is prominently placed in the supermarket, making recipe choices visible to other shoppers. This could raise privacy concerns, as selecting a recipe might be considered a personal activity. The design could incorporate features that protect user privacy, such as privacy filters.

Plant based presentation
The display design does not indicate that the screen generates plant-based recipes. The MVP pilot test revealed that some users felt uncertain while using the screen whether the recipes would be plant-based. Further research should explore strategies to effectively convey the plant-based focus without causing a repelling response. This could involve using subtle messaging and visual cues helping users understand and accept the plant-based outcome of the screen.

Animal protein additions
Incoporating a small amounts of animal-based products can enhance the flavour and appeal of the recipes, while still align with the ultimate goal of the concept. For example, adding a small amount of anchovies to a sauce or crumbled feta as a topping can make a plant-based recipes more tasty. This could increase the popularity of the recipes and expand the target audience. Implementing this strategy would require further research to evaluate its acceptance among users.

Integration with the App
Further exploration of integration with the Albert Heijn application and account is recommended. By scanning the app or Bonus card at the beginning of the interaction, the system could use personal account data to increase the chance of a recipe match. Additional research could investigate the value and possibilities of combining the App with the screen to stimulate interest in plant-rich recipes through the App. This approach allows for creating variations on familiar recipes.

Searching for products
The protein screen may suggest products unfamiliar to consumers, leading to frustration while searching for them in the supermarket. To improve convenience, the final concept includes a categorized shopping list structured by shelf. Additional features like a floor map within the app to help users locate items and clues on large display screens indicating ingredient locations are suggested. These features need further development and testing to ensure effectiveness.

12-3 Process reflection

This research explored how Albert Heijn supermarkets can inspire and stimulte young adults to compose plant-based meals through design interventions. The project used the Double Diamond framework and followed a Human-Centered Design approach, engaging users at every stage. This reflection assesses the strengths and weaknesses of each phase of the Double Diamond process.

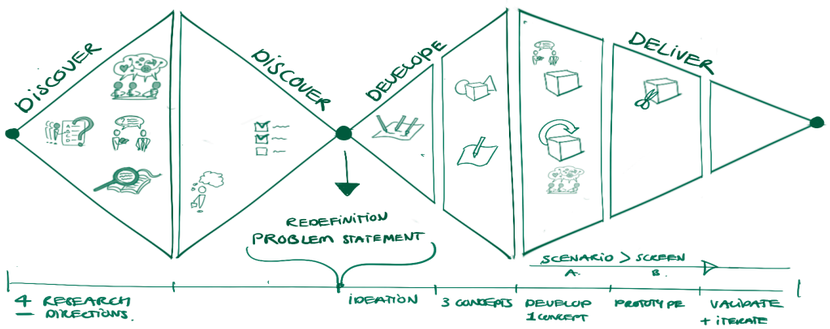
Discover Phase
In the first phase, insights were gathered through literature and field research to gain a broad understanding of young adults and consumer behaviour in supermarkets. Contextmapping within the supermarket setting revealed unexpected insights about the target group. This phase also led to a shift in focus, moving from the canned goods section to a more impactful user scenario: helping customers compose recipes when they arrive at the supermarket unprepared.

Define Phase
In the second phase, the collected information was refined and translated into a design statement. This phase was challenging due to the initial lack of suitable methods. Ultimately, the COM-B model was employed to distill the key insights, and a simple story board was created to communicate the design problem to stakeholders. This phase concluded in the formulation of design criteria that would guide design decisions throughout the project.

Develop
In the third phase, idea generation was a primary focus, with design sessions conducted alongside the target group. Numerous ideas were brainstormed and then evaluated against the design criteria, resulting in four potential concept directions. However, this process lacked a structured method for organising ans assessing the ideas. To ensure alignment with Flevo Campus's expectations, multiple concepts were presented for feedback. This input helped establish a clearer direction and provided structure to the project.

Deliver Phase
The fourth phase was divided into concept development using the SCAMPER method to diversify concept features, providing an overview for the rest of the design project. The phase concluded with extensive concept validation involving an MVP pilot test. This test generated substantial feedback, which allowed for design iteration and insights for further development.

Overall, the process revealed strengths in immersive research, user-centered idea generation abd concept development and extensive product testing and validation. However, challenges in information organisation were identified, guiding future improvements.



12 chapter

Conclusion

11-1 Conclusion

In conclusion, this graduation project explored how in-store supermarket interventions could stimulate plant-based meal choices among young adults. Guided by the design statement: "To stimulate young adults to choose plant-based meals, we want them to feel eased and inspired by providing convenient and appealing recipe suggestions that make plant-based choices effortless and enjoyable," the project sought to make plant-based recipes compositing both convenient and enjoyable.

The research phase includes literature and field research which provided valuable insights into consumer behaviour and the challenges of promoting plant-based diets. Using these insights, the Protein Screen was developed as an interactive tool designed to offer engaging plant-based recipe suggestions directly within the supermarket environment. This design encourages young adults to choose plant-based meals through a fun and interactive experience. In the context of a supermarket with thousands of food options, this screen simplifies decision-making by guiding users through a streamlined choice architecture.
The Protein Screen's effectiveness was validated through MVP testing, which provided valuable feedback and led to an iteration on the final concept. The concept was well-received and proved to fit good within the user scenario. However, future research should focus on strategies to improve the user experience and better communicate the plant-based focus of the Protein Screen.

In conclusion, this design project successfully tackles the research question, "How can the supermarket inspire, guide, and stimulate young adults in composing plant-based meal recipes?" through the innovative Protein Screen. By integrating behavior change theory, the Protein Screen transforms the common dilemma of "What am I having for dinner tonight?" into an opportunity for positive change. It intervenes at a crucial moment, when users are tired after a long day, making plant-based meal selection both simple and enjoyable. Ultimately, this design not only eases daily decision-making but also nudges society towards a plant-based plate of the future.

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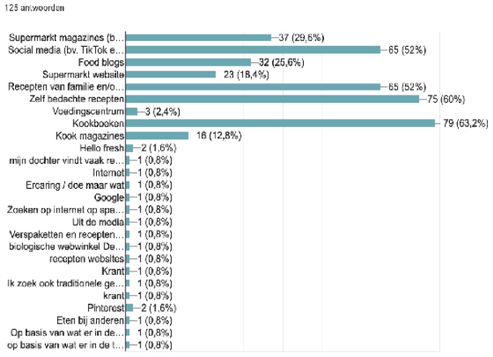
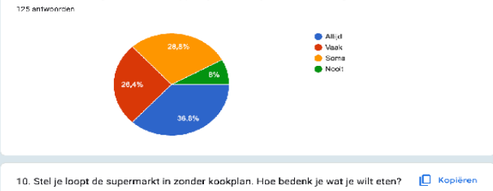
Appendix A: Questionnaire awnsers

13. Waar doe je inspiratie op voor het verzinnen van een avondmaaltijd?

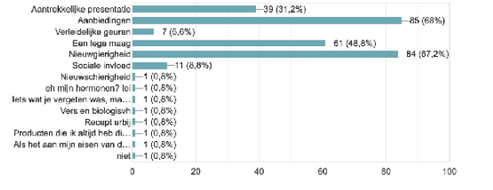


9. Hoe vaak maak je een boodschappenlijst voordat je naar de winkel gaat?

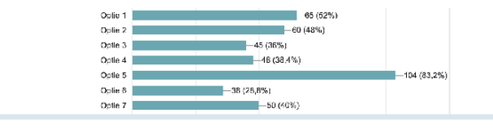


10. Stel je loopt de supermarkt in zonder kookplan. Hoe bedenk je wat je wilt eten?

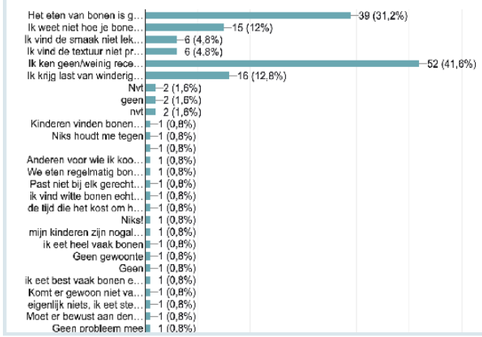
20. Wat leidt jou ertoe om een impulsieve aankoop (=een aankoop die niet op je boodschappenlijst staat) te doen in de supermarkt?



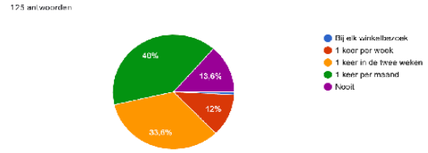
21. Welke bonenproducten koop jij wel eens in de supermarkt?



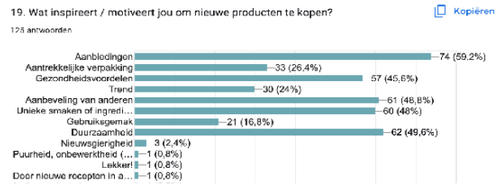
24. Welke factoren houden jou tegen om vaker (een bepaald soort van) bonen te eten



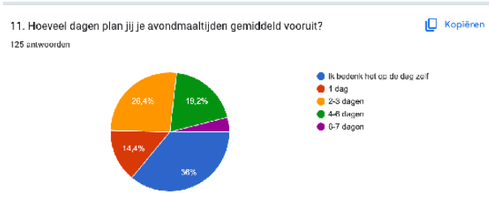
18. Hoe vaak koop je nieuwe producten en merken tijdens het winkelen in de supermarkt?



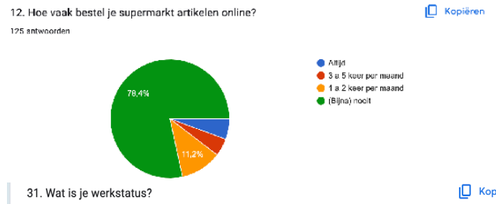
19. Wat inspireert / motiveert jou om nieuwe producten te kopen?



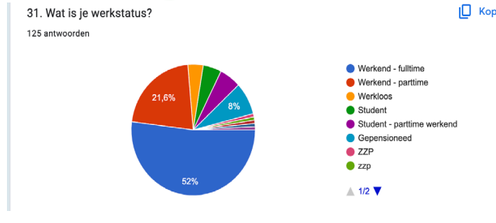
11. Hoeveel dagen plan jij je avondmaaltijden gemiddeld vooruit?



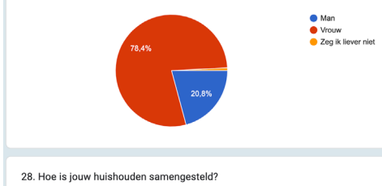
12. Hoe vaak bestel je supermarkt artikelen online?



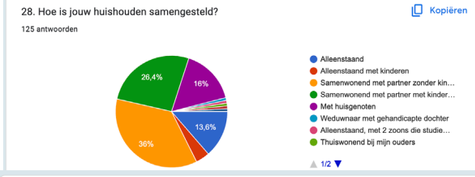
31. Wat is je werkstatus?



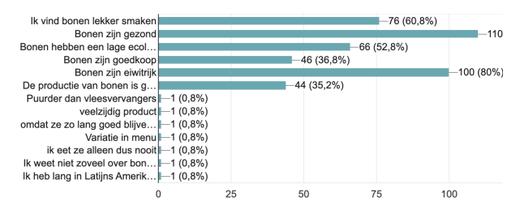
27. Geslacht



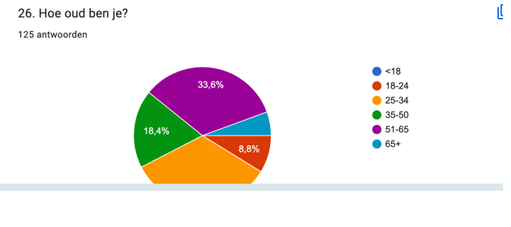
28. Hoe is jouw huishouden samengesteld?



25. Welke factoren motiveren jou om (een bepaald soort van) bonen te eten



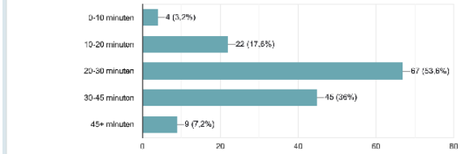
26. Hoe oud ben je?



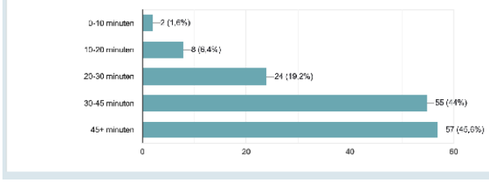
23. Zo ja, wat voor een soort gerecht(en) met bonen heb je gegeten?

Chili sin carne
Wraps
Soep
Echt vanalles
pokébowl
Curry, chili sin carne, witte bonen humus
Stoofschotel, wraps, cassoulet, zwarte bonen burgers
Mexicaanse bonentaart
Curry of in een salade

6. Hoeveel tijd wil je maximaal besteden aan een doordeweekse maaltijd



7. Hoeveel tijd wil je maximaal besteden aan een weekend maaltijd



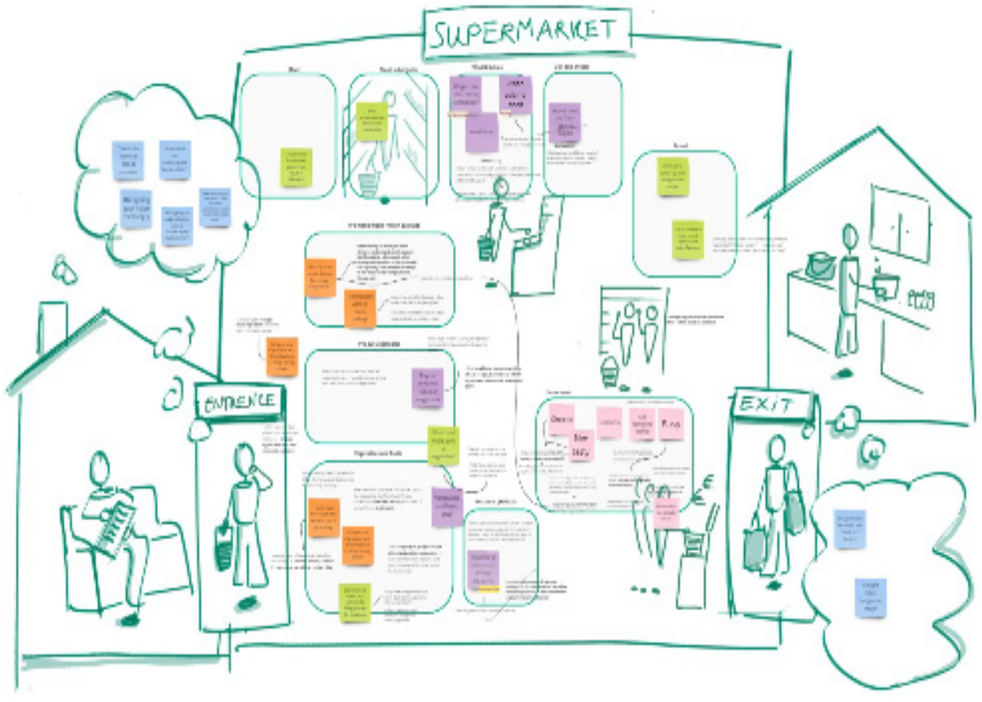
16. Wat ervaar je als positief tijdens een supermarkt bezoek?

Ruime keuze
Gevulde schappen
weinig
Toegankelijkheid
gezellige muziek (Jumbo Radio :)), aangename temperatuur, genoeg ruimte om met je karretje te lopen, vlotte kassa's, logische indeling van de schappen
Als er een overdaad aan groentes te zien is en inspiratie in het schap (dus wat past goed bij wat)
Aanbiedingen, verse onbewerkte producten, aandacht voor plantaardige maaltijden
Goede versproducten

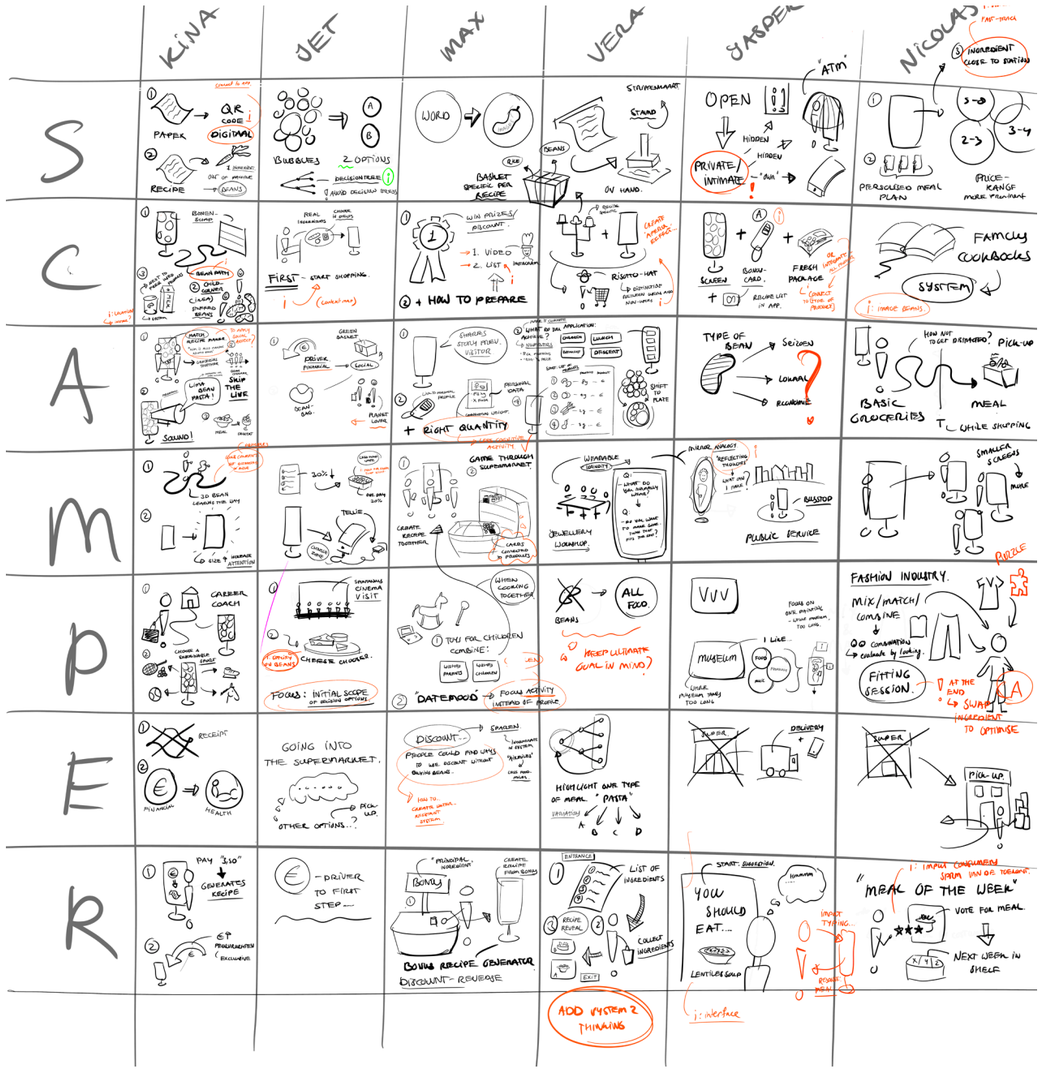
17. Wat ervaar je als negatief tijdens een supermarkt bezoek?

Drukte
Drukte en lege schappen
Al het plastic en onrealistische standaard voor groenten
weinig ruimte om te manoeuvreren, lege schappen, airco te hard aan waardoor steenkoud, luidruchtig personeel
Lege schappen, herhaling en onderontwikkeling van een schap
Als iets op is, als iets (onnodig) van ver komt, de hoeveelheid gemaksproducten, verpakt water
Slechte versproducten ;-)
? (onduidelijke vraag)
Veel prikkels en verleidingen (ongezonde voeding)

Appendix B : Context mapping analysis



Appendix C: SCAMPER analysis



Appendix D: Respondents awnsers to MVP test

- **Wednesday, July 3, 2024: Participants 1 to 14: 4:00-6:10 PM**
- **Wednesday, July 3, 2024: Participants 15 to 24: 6:30-8:00 PM**
- **Thursday, July 4, 2024: Participants 25 to 35: 3:30-6:00 PM**
- **Thursday, July 4, 2024: Participants 36 to 42: 6:20-7:40 PM**

Type of Recipe Chosen

Participant 1: Pasta > Pasta with Broccoli
Participant 2: From the Oven > Traybake with Baby Potatoes
Participant 3: Summer Salad > Black Bean Rice Salad
Participant 4: Summer Salad > Sweet Potato Salad
Participant 5 (the meat griller): Pasta > Pasta with Broccoli
Participant 6: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 7: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 8: From the Oven > Would choose both Traybake recipes (can't decide)
Participant 9: From the Oven > Traybake with Asparagus, Feta, and Olives
Participant 10: Asian > Whole Wheat Noodles with Red Cabbage
Participant 11: From the Oven > Traybake with Feta, Olives
Participant 12: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 13: Asian > Whole Wheat Noodles with Red Cabbage
Participant 14: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 15: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 16: Asian > Whole Wheat Noodles with Red Cabbage
Participant 17: From the Oven > Traybake with Baby Potatoes
Participant 18: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 19: Curry > Potato Eggplant Curry with Peanuts
Participant 20: From the Oven > Traybake with Asparagus, Feta, Olives
Participant 21: Curry > Potato Eggplant Curry with Peanuts
Participant 22: From the Oven > Traybake with Asparagus, Feta, Olives
Participant 23: Pasta > Spaghetti with Broccoli and Anchovies
Participant 24: Summer Salad > Black Bean Rice Salad
Participant 25: Pasta > Spaghetti with Broccoli and Anchovies
Participant 26: Summer Salad > Avocado Salad with White Beans
Participant 27: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 28: From the Oven > Traybake with Baby Potatoes
Participant 29: Curry > Potato Curry Eggplant
Participant 30: Pasta > Spaghetti with Broccoli and Anchovies
Participant 31: Asian > Whole Wheat Noodles with Red Cabbage
Participant 32: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 33: Tacos > Black Bean Tacos
Participant 34: From the Oven > Traybake with Tomatoes and Baby Potatoes
Participant 35: Pasta > Pasta with Broccoli and Anchovies
Participant 36: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 37: Pasta > Pasta with Broccoli and Anchovies
Participant 38: From the Oven > Traybake with Feta, Olives
Participant 39: Tacos > Vegetable Chili Tacos
Participant 40: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 41: Asian > Noodles with Japanese Stir-Fried Vegetables
Participant 42: From the Oven > Traybake with Feta

Did the Protein Screen Help You in Choosing a Recipe?

Participant 1: (seeing the two recipe options on the screen) Oh Jesus, no, one recipe has fennel and the other has anchovies. I don't really like either of these.
Participant 2: Yes, although these are completely different recipes than I normally eat. But it's very nice to get new meal inspiration this way, I'm quite surprised.
Participant 3: No, I always come to the supermarket with a plan and I know exactly what I want to eat. This recipe also doesn't appeal to me much.
Participant 4: Yes, somewhat, but I have a question: does the screen also consider allergens like lactose intolerance? If not, I'm not sure if I would use it again.
Participant 5: No, I'm having a barbecue tonight. And I miss meat options in the recipe choices.
Participant 6: Somewhat, and the recipe looks tasty, but I usually have a cooking plan when I enter the store.
Participant 7: Yes, normally I always use the paper recipe inspiration cards in the store. But this is faster and more sustainable because I don't use paper now.
Participant 8: Yes, both recipe pictures look very tasty.
Participant 9: Yes, I'm quite surprised by this recipe. It's not something I would make quickly myself, but I'm curious to try it out.
Participant 10: Yes, I never know what to cook and this recipe is something I would never have thought of myself. I must say that I'm pretty bad at trying new dishes. I usually stick to the recipes I already know or have in my head. But the recipe on the screen looks very tasty!
Participant 11: Yes, somewhat. If I didn't already have a meal plan, I might have gone for this recipe.
Participant 12: Yes, I'm quite surprised by the recipe. I would never have thought of this myself.
Participant 13: Yes, it looks quite tasty.
Participant 14: Yes, I received a noodle recipe, but I already planned to eat noodles.
Participant 15: (this participant filled out the screen several times because they were not satisfied with the recipes that came out) No, the recipes don't appeal to me much. I must also honestly say that when I enter the supermarket, I usually immediately look at the bonus offers.
Participant 16: I did get a recipe now, but I wonder if people will really use this screen in the store, privacy-wise. Other people can watch you and see what you might be eating tonight. And you also have an Albert Heijn app, so why have a screen in the store?
Participant 17: Yes, it was easy and very quick, very chill if this would be in the supermarket. I think it could be a good help for people.
Participant 18: Yes, after a few clicks I now have a recipe for tonight.
Participant 19: Yes, it looks tasty.
Participant 20: Yes, I would never have thought of this recipe myself.
Participant 21: Yes, I would never have thought of this myself.
Participant 22: Yes, it seems like a tasty recipe, but I will first check with my partner to see if he likes it too.
Participant 23: Yes, I feel like having spaghetti tonight.
Participant 24: Yes.
Participant 25: No, I'm a picky eater and I dislike many vegetable options.
Participant 26: Yes, I think there are enough choices in different food moods and recipes.
Participant 27: Yes, I think my little one will like this too. I find this very handy for when I don't know what to cook.
Participant 28: Yes, I often enter the supermarket without inspiration, then I would use this screen. I never have inspiration, it's really terrible. When I enter the store, I often go to the meal kits for inspiration, but this screen would also help me get inspired. I like it to be made as easy as possible for me.
Participant 29: Yes, very handy! I'm now curious about this recipe. It's easy to make a quick choice.
Participant 30: No.
Participant 31: Yes, you immediately see all the ingredients, which is very nice. It feels a bit like HelloFresh, that's how easy it is.
Participant 32: I often enter the store unprepared, I really decide what I feel like eating per day. Often, when I'm in the store, I decide what I'm going to eat. This screen is really handy! I would actually make both recipes.
Participant 33: Yes, it's definitely nice for people who don't know what to make.
Participant 34: Yes, but I would simplify the recipe.
Participant 35: Yes, I often enter the supermarket without a plan for dinner. If I know this screen is in the store, I no longer have to quickly check TikTok in the car for what to eat that night. Then I know I can walk to this screen. I always check TikTok for meal inspiration.
Participant 36: No, I wouldn't choose either option, I'm not a fan of noodles.
Participant 37: Yes, I often enter the store without knowing what to eat. The recipe I received looks very tasty, the picture was very important to me.
Participant 38: Yes, certainly! It brings me new ideas. I would never have thought of this myself. Very interesting!
Participant 39: "Yes, it's very intuitive and quick."
Participant 40: "Yes, I would use the screen if I'm unsure what to cook and want inspiration; the recipe picture looks very appealing."
Participant 41: "Yes, I like that the screen offers different options, so you discover new things."
Participant 42: ""I often shop without a meal plan after work, this screen offers quick inspiration",

Will you buy the ingredients and make the recipe?

Participant 1: "No, both recipes include ingredients I don't like. Even if I removed them, the recipes still don't appeal to me."
Participant 2: "Yes, I like that you can see the calorie content of the recipe ingredients. I'm into fitness, so this is important to me."
Participant 3: "No, these ingredients aren't ones I usually eat."
Participant 4: "No, I'm not interested in these two recipes."
Participant 5: "No, I don't like broccoli or fennel."
Participant 6: "Maybe, I like to experiment, and the picture looks tasty."
Participant 7: "No, not now, as I already had a recipe in mind."
Participant 8: "Maybe, I'm not sure yet."
Participant 9: "Yes!"
Participant 10: "Yes, the recipe looks good, but I prefer recipes with ingredients I'll use again soon. Otherwise, they end up sitting in my cupboard and going to waste."
Participant 11: "No, I already had a recipe in mind when I arrived."
Participant 12: "Yes, I know what I'm having for tonight, but I'll get the ingredients to make it tomorrow."
Participant 13: "Yes, I think I'll try this recipe next week. It looks good."
Participant 14: "Yes, I was already planning to have noodles tonight. This recipe gives a new twist, so I'll try it out."
Participant 15: "No, I usually decide based on the type of meat, like chicken or pork, and then plan a meal around that."
Participant 16: "No."
Participant 17: "Yes, I'm surprised by this recipe; I wouldn't have thought of it myself."
Participant 18: "Yes, it looks healthy and tasty."
Participant 19: "I think so."
Participant 20: "Yes, I'd make it another day."
Participant 21: "Yes, I think I would, for a different day. I'm getting hungry just thinking about it."
Participant 22: "Yes, I think so. I'll scan the recipe."
Participant 23: "Yes, but I'd leave out the anchovies as I don't like them."
Participant 24: "Yes, it looks very healthy."
Participant 25: "No, there are too many ingredients I don't like."
Participant 26: "No, I'm having pasta. The combination of lima beans in a cold salad with avocado doesn't seem appealing. I've never tried it, but it doesn't sound good."
Participant 27: "Yes, it seems like a tasty recipe."
Participant 28: "No, this recipe doesn't quite appeal to me."
Participant 29: "Yes, I like this kind of dish! It's vegetarian, but it might be clearer on the screen."
Participant 30: "No, I don't like anchovies and find the texture and skin of beans unappealing. If both recipes have beans, I wouldn't make either."
Participant 31: "Yes, I'd make this for tomorrow."
Participant 32: "Yes, does it integrate with the AH app?"
Participant 33: "Yes."
Participant 34: "Yes, but I'd remove the beans, as I don't like them."
Participant 35: "Yes, but I'd leave out the anchovies."
Participant 36: "No, I cook mostly chicken dishes. The screen can inspire others, but not me."
Participant 37: "Yes, I'll use this for another evening."
Participant 38: "Maybe for another evening."
Participant 39: "Yes, I scanned the recipe. It's different from what I usually cook, but I think it could work."
Participant 40: "Yes, maybe next week."
Participant 41: "No, my mom wouldn't eat this recipe. If I made it, I'd add my own twist."
Participant 42: "Yes, I think I'll try this recipe tomorrow when I have more time."

Are you aware that the recipe includes legumes? Did the screen encourage you to cook with legumes tonight?

Participant 1: "No, I hadn't noticed. I do cook with beans regularly because I like them."
Participant 2: "Yes, I noticed. These recipes show different ways to use beans, which I hadn't considered."
Participant 3: -
Participant 4: "No, I hadn't noticed. I do cook with beans regularly."
Participant 5: "No, I don't eat beans; I don't like them."
Participant 6: "No, I didn't see that, but I'm not a fan of beans."
Participant 7: "Oh really? I didn't notice, but I eat beans fairly often."
Participant 8: "No, I didn't see it, but I already eat a lot of beans."
Participant 9: "Yes! I saw chickpeas in the recipe."
Participant 10: "No, I didn't notice. But if I had, it wouldn't stop me from making the recipe, as I like beans."
Participant 11: "Not consciously, but I eat everything, so I don't pay much attention to beans."
Participant 12: "I didn't fully notice the beans, but it doesn't stop me as I like beans."
Participant 13: "No, I didn't notice."
Participant 14: "Yes, I saw edamame beans in the recipe, which I already eat a lot."
Participant 15: "No, I didn't see it. I rarely cook with beans and stick to recipes I know."
Participant 16: "Yes, I saw that both recipes include beans, but I cook with beans quite a bit."
Participant 17: "No, I don't cook with beans often, but these recipes might encourage me to use them more."
Participant 18: "No, I didn't notice, but beans wouldn't stop me from making the recipe."
Participant 19: "Yes, I noticed. We eat legumes often because we eat a lot of Indian food."
Participant 20: "No, I didn't notice. I like that all recipes include beans since I'm not looking for meat recipes."
Participant 21: "Yes, but I cook with beans a lot."
Participant 22: "No, but I do cook with beans often, like in chili sin carne."
Participant 23: "I noticed beans in one of the recipes. I cook with beans a lot, but not as a meat substitute. In Surinamese cuisine, we often combine beans with meat. This screen might help people use beans more as a meat substitute."
Participant 24: "No, I didn't notice beans in the recipe."
Participant 25: "Yes, I noticed. If I made the recipe, it would be the first time I ate beans in a while."
Participant 26: "Yes, lima beans stood out in the recipe I chose."
Participant 27: "Yes, I noticed. I already cook with beans a lot."
Participant 28: "No, I didn't notice. It didn't appeal to me much."
Participant 29: "Yes, I saw it contained legumes, which attracted me."
Participant 30: "No, I don't like beans. I find the texture and skin unappealing. If both recipes have beans, I wouldn't make either."
Participant 31: "No, I didn't notice. I do appreciate the plant-based proteins since I'm into fitness."
Participant 32: "Yes, I like Indonesian cuisine, but I'm not a fan of beans."
Participant 33: "Yes, I'm now inspired."
Participant 34: "Yes, I noticed. I'd leave them out since I don't like them."
Participant 35: "Yes, I cook with beans a lot and like them. This screen would encourage me to use beans more."
Participant 36: "If it tastes good, why not? I don't need meat in a dish."
Participant 37: "I cook with beans a lot. This screen would encourage me to cook with beans more, as my partner is a vegetarian."
Participant 38: "I eat beans occasionally, usually with meat."
Participant 39: "No, I don't usually cook with beans."
Participant 40: "Yes! I saw the edamame beans, so I'd buy those if they were in the recipe."
Participant 41: "No, I didn't notice. I don't pay much attention to beans."
Participant 42: "Yes, I noticed beans. This screen encourages me to cook with them more."

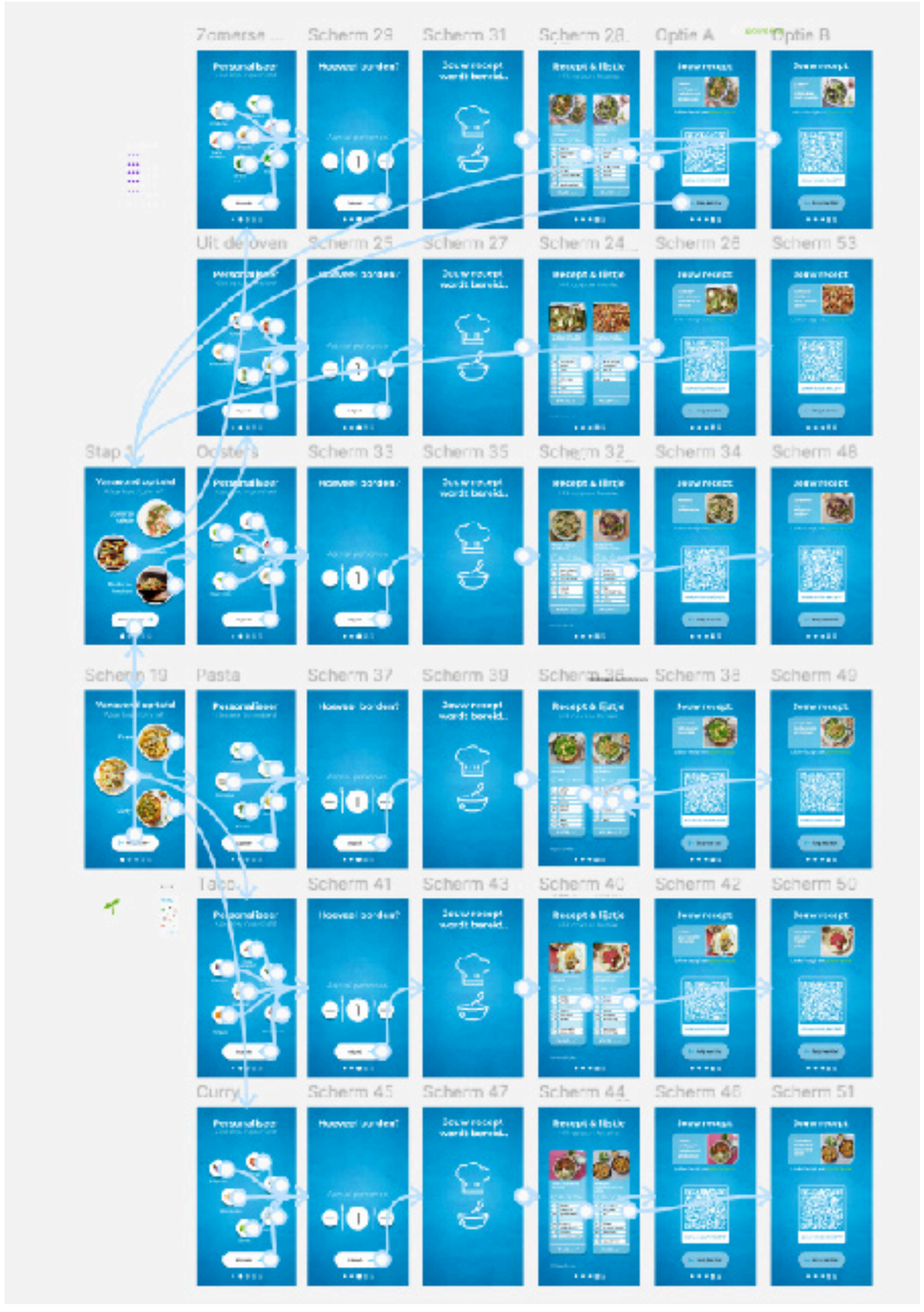
What do you think of the design?

Participant 1: “The design is nice. The picture quality is good, and it’s intuitive. I can see the recipe without scrolling. A list of ingredients and cooking steps are clearly visible.”
Participant 2: “The design looks good. It’s easy to navigate, and the recipe is clear.”
Participant 3: “The design is simple and intuitive. I like the way it’s organized.”
Participant 4: “I like the design. It’s clean and straightforward. The recipe format is easy to follow.”
Participant 5: “The design is clear and user-friendly. The visual appeal of the recipe is great.”
Participant 6: “The design is good. The pictures are nice and clear.”
Participant 7: “The design is very user-friendly and visually appealing.”
Participant 8: “I like the clean design. The recipe layout is easy to understand.”
Participant 9: “The design is modern and easy to use. The recipe is well presented.”
Participant 10: “The design is clean and effective. It’s easy to navigate and follow.”
Participant 11: “I like the simple design. It’s easy to read and understand.”
Participant 12: “The design is visually pleasing and practical. I appreciate the clarity.”
Participant 13: “The design is functional and attractive. The recipe presentation is great.”
Participant 14: “The design is very appealing. The layout makes it easy to read the recipe.”
Participant 15: “The design is nice and straightforward. The recipe presentation is clear.”
Participant 16: “I like the design. It’s simple and effective.”
Participant 17: “The design is clean and easy to use. I appreciate the layout.”
Participant 18: “The design is good. The recipe is presented clearly, and the layout is user-friendly.”
Participant 19: “I like the design. It’s easy to follow and aesthetically pleasing.”
Participant 20: “The design is effective and easy to navigate. I like the layout.”
Participant 21: “The design is good. It’s clean and the recipe is easy to follow.”
Participant 22: “The design is user-friendly and visually attractive.”
Participant 23: “I like the design. It’s clean and well-organized.”
Participant 24: “The design is modern and clear. The recipe presentation is good.”
Participant 25: “The design is very user-friendly and appealing.”
Participant 26: “I like the design. It’s straightforward and easy to use.”
Participant 27: “The design is practical and clear. The recipe layout is effective.”
Participant 28: “The design is clean and modern. It’s easy to follow.”
Participant 29: “The design is good. It’s easy to navigate and the recipe is clear.”
Participant 30: “The design is user-friendly and appealing. The recipe layout is easy to follow.”
Participant 31: “The design is simple and effective. The recipe presentation is clear.”
Participant 32: “I like the design. It’s clean and easy to read.”
Participant 33: “The design is functional and modern. It’s easy to use.”
Participant 34: “The design is good. It’s clean and the recipe is well-presented.”
Participant 35: “The design is straightforward and user-friendly.”
Participant 36: “The design is modern and easy to use. The recipe presentation is clear.”
Participant 37: “The design is clean and effective. The recipe is easy to follow.”
Participant 38: “The design is good. It’s easy to navigate and follow the recipe.”
Participant 39: “The design is very user-friendly. The recipe is presented clearly.”
Participant 40: “The design is attractive and practical. The recipe is easy to follow.”
Participant 41: “The design is simple and effective. The recipe layout is clear.”
Participant 42: “The design is good. It’s easy to use and navigate.”

How could the design be improved?

Participant 1: “Add a filter to exclude ingredients I don’t like.”
Participant 2: “Provide an option to adjust portion sizes.”
Participant 3: “Include a shopping list feature.”
Participant 4: “Add an option for dietary preferences, like vegan or gluten-free.”
Participant 5: “Allow users to save favorite recipes.”
Participant 6: “Include a feature to adjust the number of servings.”
Participant 7: “Provide ingredient substitution suggestions.”
Participant 8: “Add a timer feature for cooking steps.”
Participant 9: “Include a nutritional breakdown for each recipe.”
Participant 10: “Provide links to related recipes or meal plans.”
Participant 11: “Add a meal planning feature to organize weekly recipes.”
Participant 12: “Include a feature to customize recipes based on dietary restrictions.”
Participant 13: “Add user ratings and reviews for recipes.”
Participant 14: “Include video instructions for each recipe.”
Participant 15: “Allow users to filter recipes based on ingredients they have at home.”
Participant 16: “Add a feature to scale recipes based on the number of servings.”
Participant 17: “Provide a step-by-step guide with pictures for each cooking stage.”
Participant 18: “Include more diverse recipe options, like international cuisines.”
Participant 19: “Add a section for user-submitted recipes.”
Participant 20: “Include a feature for meal prep and storage tips.”
Participant 21: “Add a shopping list generator for the ingredients.”
Participant 22: “Provide a calorie and macronutrient breakdown for each recipe.”
Participant 23: “Include a feature to track ingredients’ freshness and usage.”
Participant 24: “Add a recipe suggestion feature based on seasonal ingredients.”
Participant 25: “Provide options for ingredient adjustments based on dietary needs.”
Participant 26: “Include a search function to find recipes by ingredient or cuisine.”
Participant 27: “Add more visual aids for cooking techniques.”
Participant 28: “Include a feature to save and organize recipes by category.”
Participant 29: “Add more detailed cooking instructions and tips.”
Participant 30: “Include options for recipe scaling based on servings.”
Participant 31: “Provide a feature for recipe adjustments based on user feedback.”
Participant 32: “Add a feature to suggest recipes based on leftover ingredients.”
Participant 33: “Include a filter for recipes based on cooking time.”
Participant 34: “Add a section for alternative cooking methods.”
Participant 35: “Provide a feature for users to share their own recipes and tips.”
Participant 36: “Include a section for seasonal recipes and ingredient guides.”
Participant 37: “Add a feature to customize recipe ingredients based on availability.”
Participant 38: “Provide options for recipe adjustments based on dietary restrictions.”
Participant 39: “Include a feature to adjust recipes based on ingredient availability.”
Participant 40: “Add more detailed ingredient lists and cooking techniques.”
Participant 41: “Include a feature for users to rate and review recipes.”
Participant 42: “Add a feature to customize recipes based on personal preferences.”

Appendix E: MVP Figma overview



Appendix F: MVP example sequence

A.

Jonas sees a screen reponse to the question 'What do you feel like' by clicking on the ' summer salade option

B.

Jonas costumise his recipe by clicking on sweet potatoes and avocado.

C.

Jonas decides on how many portions he likes to make by cliking on the - or + buttons.

D.

Jonas looks at a personalised animation - wathcing his selected recipe theme and ingredients merges together into a recipes

E.

Jonas compares the recipes and decides on the salade with sweet potatoes and lima beans, because he preferes those increadients

F.

Jonas reads he made a green decision by using the protein screen and encourages. He scans QR code.

Appendix G: Project brief

DESIGN FOR our future

TU Delft

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	STOOP	IDE master(s)	IPD ✓ Dfl SPD
Initials	V E	2nd non-IDE master	
Given name	VERA	Individual programme (date of approval)	
Student number	4685180	Medisign	
		HPM	

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

Chair	JanWillem Hoftijzer	dept./section	Human Information Communication
mentor	Hendrick Schifferstein	dept./section	Design Aesthetics
2nd mentor	Guus Nelissen		
client:	Flevo Campus		
city:	Almere	country:	the Netherlands
optional comments			

! 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)

Jan Willem Hoftijzer — Digitally signed by Jan Willem Hoftijzer Date: 2024.06.20 10:28:57 +02'00'

Name J.W. Hoftijzer Date 8 mrt 2024 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 1st year master courses passed
	NO	missing 1st year courses

The comment shown here has not been entered by SPA. All first year courses have been completed.
Rik Ledoux

Comments:

To complete my first year of master courses I need to obtains the ect's for Manage you Master and IDE Academy. Before 01/02 will hand in the the final MYM deliverable and for IDE Ac I only need to attend two more workshop days

Sign for approval (SSC E&SA)

Rik Ledoux
2024.06.20
13:50:47 +02'00'

Name Rik Ledoux Date 20 Jun 2024 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: 2024.07.02 11:37:05 +02'00'

Name Monique von Morgen Date 2 Jul 2024 Signature

DESIGN FOR our future

TU Delft

Personal Project Brief – IDE Master Graduation Project

Name student Vera Stoop **Student number** 4,685,180

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Incorporation of beans into the Dutch diet through retail

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)

This project is situated within the context of the protein transition within the Dutch diet, signifying the movement away from animal-based protein sources towards more environmentally sustainable plant-based alternatives. My focus will centre on beans and legumes due to their rich protein content, low climate impact, and suitability for cultivation in the Netherlands (Singh & Virk, 2020).

The consumption of beans and legumes is influenced by various factors such as cultural habits, food environment, social standards (Lanjouw et al., 2024), and wealth level (Broekaert, 2023). Despite recommendations from the RIVM for a daily intake of 75 grams (RIVM, 2021; Willet et al., 2019), Dutch consumption remains relatively low at 7 grams per day. In contrast, the average daily Dutch diet includes 100 grams of meat and 0.35 liters of dairy (Lanjouw et al., 2024).

Flevo Campus is a knowledge and action lab that supports the protein transition by connecting the stakeholders and finding solutions to complex food problems. The following stakeholders involved in the 'bean revolution' include science, retail, entrepreneurs, government and consumers (Lanjouw et al., 2024).

On February the 8th, 2024, Flevo Campus launched a White Paper, concluding the following message regarding beans:
The production side of the food system is ready to increase the production.
The retail industry must stimulate the consumption of beans and consumers should be inspired to incorporate beans into their diet.

I'll delve into consumer behaviour and incentives, as well as explore the potential roles and strategies of supermarkets in the protein transition.As a result, the project will concentrate on the environment where consumers most often encounter beans; in supermarkets.

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introduction (continued): space for images

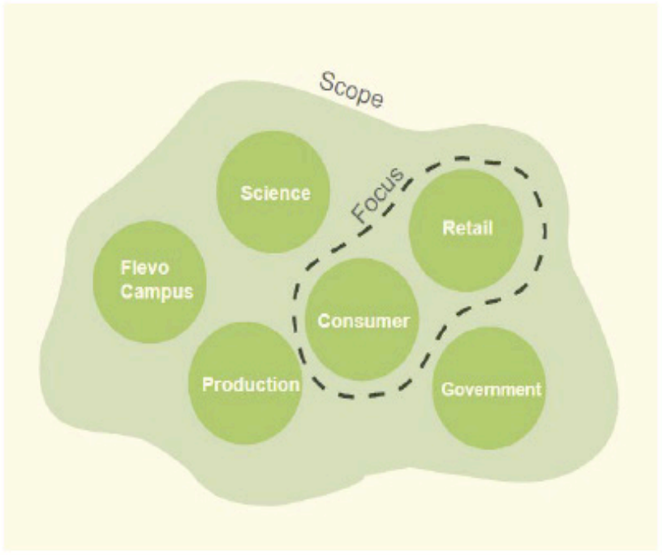

image / figure 1 Scope and focus of the project including stakeholders

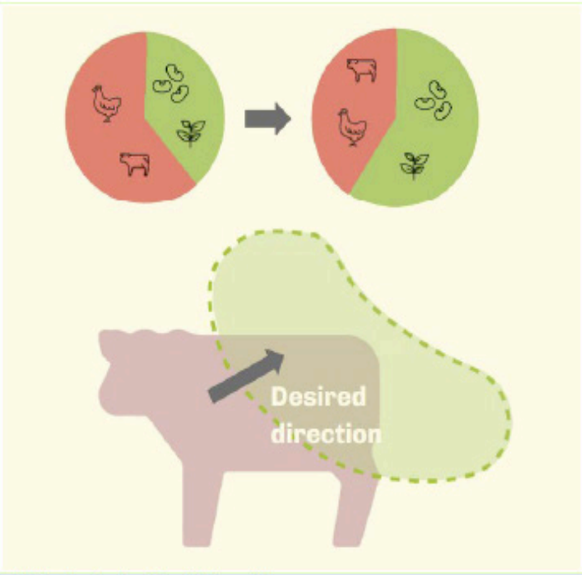

image / figure 2 Intended design direct and protein transition

DESIGN FOR our future

TUDelft

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)

Beans and legumes are experiencing a decline in consumption within the Dutch dietary pattern due to the static and unchanged nature of the canned goods section in supermarkets (Lanjouw et al., 2024).

The issue has two aspects. Firstly, supermarkets are reluctant to innovate the canned goods section because of the relatively low demand for beans from consumers. While other sections evolve, the beans and legumes section remains stagnant. Secondly, consumers are not encouraged by supermarkets to buy beans or legumes. There's a lack of exploration for new products or inspiration in the canned goods aisle (Lanjouw et al., 2024). Metaphorically speaking, I see these stakeholders as two creaking gears in need of oil to start rotating simultaneously (the engine of the protein transition).

Flevo Campus has conducted theoretical research. In the next 100 days, I aim to translate this information, along with other research, into dietary interventions designed to encourage consumers to incorporate more beans into their diets. Through prototypes and test setups, these interventions will be evaluated by consumers in Almere supermarkets. This process could offer valuable insights for supermarkets and encourage a more significant and innovative role for beans and legumes to expedite the protein transition in line with Flevo Campus's mission.

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:

Design an intervention and validate a prototype to innovate the position of beans and legumes in Dutch retail and stimulate the consumer to incorporate more plant-based proteins into the Dutch diet

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)

For my graduation project, I will utilize a traditional design thinking methodology consisting of four main stages. However, going through the double diamond multiple times often results in iterations in the project. The following section includes a summary of the project approach, including research- and design methods. The following link contains a online spreadsheet with an elaborated version of the project approach Project approach - Vera Stoop. This is a working document and will be adapted throughout the design project.
Discover..
.. the role a supermarket could play in the protein transition - desk research, interviews, expert consult
.. the context of purchasing beans in supermarket - context mapping, customer journey, observations
.. consumers' stakes and behaviour by interviews, questionnaires and desk research
Define.. by clustering insights, (re)define the problem and (potentially) focus on a target group
Develop.. by ideating toward solutions, prototype development, testing in context with the prototype, followed by evaluation and iteration
Deliver.. by documentation and visualisation of report and presentation

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 feb 2024
Mid-term evaluation	8 apr 2024
Green light meeting	17 juni 2024
Graduation ceremony	8 juli 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)

Motivation
My primary motivation for embarking on this project is my incentive for contributing to a more sustainable food industry.
I aim to leverage my background in product design to understand the intricacies of food properties and explore the opportunities as a designer within the food industry.
The project involves conceptualisation, allowing me to further develop my skills in translating information into design solutions.
The project presents complexity due to the diverse array of stakeholders involved. As the sole industrial designer within the Flevo Campus project, I must position myself and communicate my role and contribution clearly with the team (who might not have experience with designers). I believe this is a valuable experience.
Outside of an academic setting, I seek to apply my theoretical knowledge to practical scenarios within the real world.

Personal learning ambitions:
Handling individual project management - focussing on identifying and addressing priorities effectively.
Possessing comprehensive knowledge of sustainable food systems.
Understanding strategies for navigating interactions with stakeholders, particularly in retail, who prioritise margins.
Develop my competence of visualisation for effective communication with stakeholders throughout the project.