Transparency between consumers and grocery stores
Evincer - A design prototype to empower consumer experience during grocery shopping

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Abstract

This study explores how the interaction design techniques approach can contribute to enabling more transparency in physical shopping by creating bridges between consumers and various stakeholders. The aim is to empower the consumers to make informed decisions through obtaining and understanding health and environmental information for individual commodities.

Through close collaboration with users, and with the support of active designers, the design process results in the development of an interactive mobile application proposal. The prototype aims to create a hub between consumers and different stakeholders concerning individual products. Furthermore, the prototype grants consumers access to the information they desire, sharing or requesting product feedback from stakeholders and consumers, focusing on the environment and health aspects.
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1. INTRODUCTION

Groceries are among the most frequently purchased items in the world. In Sweden, for example, food retailing is the fourth largest production sector, with a sales volume of SEK 119 billion in 2019 (Ica Nyheter, 2019; Jordbruksverket, 2012). Shopping can be done differently with today's technology, such as online shopping or physical shopping. However, this study will refer to what Solomon (Solomon et al., 2014) refers to as traditional grocery shopping. Consumers buy their groceries and other necessities from a physical store (Solomon et al., 2014).

Solomon et al. (2014) state that the physical store is a significant contributor to our society. In the past, consumers used their senses in the physical store to evaluate products and make decisions. Over time, consumer behavior has changed (Memery, Megicks, and Williams, 2005). According to their study on ethical and social responsibility in food shopping, shoppers weigh factors such as quality and safety, human rights, ethical trade, and sustainability against common shopping factors for their convenience, such as price (Memery, Megicks, and Williams, 2005). With the above change, price became the first interaction between consumers and products. If consumers base their purchasing decisions merely on price, there may be inevitable consequences to factors like:

- **Sustainability** - how and where the product is made, with what ingredients, and how far it had to travel, in terms of carbon footprint (Fisher, K, James, K, Sheane, R, Nippress, J, Allen, SR, Cherruault, J, Fishwick, M, Lillywhite, R & Sarrouy, C, 2013).
- **Personal health** - for instance, some products contain pesticides that could have an impact on the consumer's health (Nayga, R. 1996)

Consumption is not only the purchase, but also the development of usage routines and rituals, and the concrete or symbolic transformation of the product. According to Koskijoki (1997), consumption involves selecting, purchasing, using, disposing, and recycling a product. Since millions of people visit a grocery store every day, these stores could be a source of inspiration for some consumers to learn more about the products and their impact on sustainability and health.

Today, the Nordic countries are under the influence of HCI and became one of the most digitized regions in the world (Grunfelder, 2018). Digitalization is influencing media life in the Nordic countries. The use of social media in Nordic countries is ahead of most parts of the world. Nordicom reports that "Nordic countries lead the world in paying for online news" (ibid., p. 6). About 82% to 87% of people have even used social media as a news source (ibid.). In the Nordic countries, there are many popular social media applications. However, Facebook and YouTube are the most used in Denmark, Sweden, and Norway, with 78% and 72% of the population, respectively (Audience Project, 2016). With this HCI, and the current age of social media, consumer demand for transparency has changed, as technology evolves, but not around food information. All this and more will be dealt with in this thesis research.
1.1. Problem definition

Consumers globally have had a change of desire towards wanting more information, as they demand more transparency regarding product information (Label Insights, 2016). More and more consumers start to question and wonder where products are from, and investigate ways to access ingredient information. Some consumers complain that the packaging information is not user-friendly, and described as "complicated or too small to read" (Label Insights, 2016). In Sweden, and according to the ICA Transparency presentation from Lena Sparring, Director Product Safety, and Quality ICA Sweden, consumers demand more information and better transparency. An example of some consumer quotes from the ICA presentation:

"50% of Swedish consumers are concerned about the content of food", "the ICA call center received more than 1500 questions about content and origin" (Lena Sparring Director Product Safety and Quality ICA Sweden, Transparency Presentation 2017).

Consumers even want to know more about product stories. According to David Fikle, Executive Director, FMI Foundation, Food Industry Association, "it is well documented that shoppers are asking more questions about their food today than ever before. ... However, another, more important aspect of consumer inquiries about how their food is produced, where it is grown, and what it contains is shoppers' desire for a deeper connection to their food. They want to know the story of the food and are looking for intersections - places where the details of their food's history match some aspect of their story."

Transparency could mean different things for each consumer, and the concept evolves depending on the needs and awareness influenced by factors, such as social media and new or global events. An example of how some events influence the demand for more transparency, is the "Who Made Your Clothes" Campaign. This Campaign is a movement calling for more transparency in the fashion industry, regarding working conditions in the industry. After the movement arose, more and more consumers are starting to ask about the working conditions, not just for the cloth industry but also for other industries such as farmers.

Another example is avocado farms in Chile (Alice Facchini and Sandra Laville, 2018) investigated by UHU. After this event, consumers began to ask more questions, and to demand information about sustainability and the product's origin. To answer the demand for more transparency in Sweden, the Swedish Consumer Agency supports the consumers' demand for transparency, and provides as much information as possible. For example, the consumer guide states, "Grocery stores must provide sufficient information to make independent and safe decisions." (Livsmedelsverket, 2015. However, advice and information for consumers are currently provided through labels, customer calls, and a monthly sustainability report, which is a bit behind today's digitalization surrounding consumers.

I will twist, turn, develop, and explain this fundamental concept of transparency in different ways throughout this thesis by exploring with consumers, and perceiving a fresh perspective from today's situation.

Consumers are also increasingly demanding higher levels of sustainability. In supply chains and especially in transportation, consumers now value and demand sustainability in all three categories of the triple bottom line: economic, environmental, and social. (The evolution of transparency, Sprout Social, 2021)

For a long time, the focus was on the economic aspect, intending to acquire a product or service at the lowest possible cost, until the era of sustainability and later the affection by social aspect increased (Basu et al., 2015; Bergqvist and Behrens, 2011; Johnstone and Tan, 2015).
Consumers want easy access to reliable information about who processed a product and under what conditions during the market chain, from raw material sourcing to production and transport segments. Guarantees are required that assure sustainability, and quality standards are applied at all stages (Bhaduri and Ha-Brookshire, 2011; Carter and Rogers, 2008; Svensson, 2009).

Furthermore, a recent report has been published by The Food Industry Association, which made research from 1000 shoppers. The key finding was:

- Consumers rate core factors that make a brand transparent. Shoppers say a brand or manufacturer is transparent if they provide a complete list of ingredients (62%), ingredient descriptions are in plain English (53%), certifications such as USDA Organic (48%), and provide detailed nutritional information (47%).
- less than half of the buyer’s trust the product information of manufacturers and brands completely (41%)
- Consumer needs have changed, and transparency must evolve with them. More shoppers adhere to a diet or health-related nutrition program in 2020 (64%) than in 2018 (49%). Their shopping behaviours are even more influenced by food allergies, intolerances, or sensitivities than they were two years ago: 44% reported this in 2018, 55% in 2020.
- Consumers go online to get more information. When it comes to getting more detailed product information or clarifying questions, shoppers turn to the Internet. Forty-seven percent of shoppers research ingredients online when they are unclear, and 89% would be more likely to search for details about a product if there was more online information.

Still to this day, the consumer is mainly left with the information on the product packaging and the price. Moreover, HCI research has emphasized and responded to shopping experiences. Other designers have attempted to create a better connection between consumers and products in grocery stores, such as a graceful app called Pirate Bri’s Grocery Adventure "(PBGA) seeks to empower an individual to make informed food decisions" (Bomfim, 2020). Another design aims to improve shoppers’ decision support in a physical grocery store by embedding a context-aware system in the shopping cart. (Ahn et al., 2015). And more examples in section (2.9)

But there is still a gap in how the desired information is brought to the forefront for the consumer, and how consumers confer with producers on the ground, which can be filled in a new way through modern design technologies. The demand for new transparency and the new technologies, we can access today, leave us with the question:

- How can we create an interactive tool to empower consumers’ informed decisions during grocery shopping?
- How can data related to grocery products be visualized in an interactive application?
- How can we enhance communication between consumers and stakeholders?

These questions will be answered through interaction design principles to help research, define, and design a solution.
1.2. Study motivation
Personally, I think there is a lack of transparency in Sweden about the environmental impact of food products and information about possible adverse health effects. Can too much of a good thing be bad for health?

Is it better for the environment to buy organic? Is organic food flown in from New Zealand better for the environment, and do the health benefits outweigh the carbon footprint?

I want to know the answer to these questions before buying a food product, and the information is often hard to find.

I thought it would be interesting to visualize and design a tool that can help other consumers be more transparent when shopping for food, creating more awareness of our choices’ impact on the environment and our health.

I also want to use this project to bring the issue to other researchers’ and designers’ attention and hopefully encourage them to continue working on improving the consumer environment.
2. BACKGROUND & THEORY

Describe your theoretical framework, and the academic state of the art in your chosen subfield within interaction design.

2.1. General Shopping Behaviour

In order to unveil trends of general shopping behaviour, I have found several sources, some of which state that not all human decisions are equally precise or rational (Kahneman, 2011; Stanovich & West, 2003). Their research has revealed that people generally use one of two main types of processing when making decisions. These theories are usually variations of what researchers call dual-process theories. They deal with two processing modes in humans. Researchers sometimes call these processing modes: System 1 and System 2 (Kahneman, 2011; Stanovich & West, 2003) or the peripheral route and the central route (Petty & Cacioppo, 1986; Petty, Cacioppo, & Schumann, 1983), although they occasionally have different names, depending on their precise application and theoretical discipline. In the first type of processing, people are more automatic in their thinking. They make quick inferences based on simple heuristic cues (cognitive shortcuts) in their environment. In retail, this might be a smell of baked goods that makes customers think of food or the colour red on a price tag that signals cheap (System 1). These heuristics are not necessarily rational, and they often lead to decision errors. However, they drastically speed up and simplify the decision-making process. In the second mode (System 2), individuals take more time to consider their decisions. For example, a shopper comparing many different flour variations or searching for a recipe in the store uses this type of processing.

Another explanation of why in-store marketing works, comes from attention research. While dual-processing theories assume that attention follows heuristics, other research suggests that pure attention is sometimes a prerequisite for heuristics (Orquin & Mueller Loose, 2013). Work on shelf elasticity has stated one of the most prominent examples of the "what you see is what you buy" argument. Items have been shown to sell more in eye-level shelf sections, and because they are more visible to shoppers, they are simply more likely to buy the products in question (e.g., Frank & Massy, 1970). Other research has shown a physical bias in eye movements by directing their focus to the center of what shoppers see (Atalay, Bodur, & Rasolofoarison, 2012).

It is well established empirically that people have a limited attention span when making decisions and performing tasks, and this is also true in the context of stores (Cohen & Chakravarti, 1990; Hoyer, 1984; Nordfaelt, Grewal, Roggeveen, & Hill, 2014; Park, Smith, Dudley, & Lafronza, 1989). For example, when a customer enters a grocery store, the store offers between 20,000 and 60,000 unique stock-keeping units (SKUs). Dual-process theories and attentional research align well with what researchers know about the in-store shopping process. At the same time, the average grocery shopper purchases approximately 143 unique items during an entire year, which represents only 0.7% of the products offered (Catalina, 2013). This would suggest that shoppers are primarily in a habitual shopping mode (System 1).

Extensive research in retailing has also shown that when shoppers pay sufficient attention to certain items, such as end-cap displays, the likelihood that they will purchase items they did not intend to purchase increases dramatically (Chevalier, 1975; Inman, Winer, & Ferraro, 2009; Nordfaelt, 2011a).
Moreover, that simple cues can influence shoppers’ decision-making as they use heuristics (cf. Tversky & Kahneman, 1974) when they are in their System 1 mode to guide their actions. There are many different types of in-store marketing cues and elements that influence shopper behavior, such as atmosphere, promotions, and product placement (Nordfaelt, 2009; Nordfaelt & Ahlbom, 2018; Nordfaelt et al., 2014).

2.2. The impact of consumers choice

Grocery consumption has increased and will continue to increase, as the world’s population grows. Food production has led to numerous negative impacts on the planet, such as ecosystem degradation, biodiversity loss, and, most importantly, climate change (Foley et al., 2011). Most of the negative impacts of food production are commodity production and trade (Angervall et al., 2008). This means, of course, that if we want to change current norms of food production and consumption, we should start with the production and handling of food. Since large industries are difficult to change from within, the best way to influence them is through their consumers. Nothing changes an industry as quickly as changing consumer behavior and demand.

If customers’ behavior and consumption patterns change, the industry must inevitably follow to meet demand. Awareness of ethical and sustainable food purchasing among the general population seems high. However, actual participation in sustainable purchasing activities is low (Bohne, Zapico, & Katzeff, 2015). This kind of behavior can be stimulated by more tangible and easy-to-understand facts, as D. Lindstroem and J. Kasperi showed in their project. They designed a platform named "Foodprint”. They mentioned in their report "The increased awareness influenced subjects to think more about the food they were buying." According to their findings, it was clear that if customers are given a clear and tangible overview of the impact of their food, customers will subsequently seek out more climate-friendly options. In other words, "...people make smarter climate decisions when they are presented with information about what the impacts of different options are" (Lindström & Kasperi, 2014).

2.3. Consumer’s awareness and values

Consumers are becoming savvier over time, seeking quality and reflecting on values, when it comes to shopping for food. Many considerations drive consumer preferences and behavior. International studies have shown that consumers judge food quality based on certain factors such as freshness, taste, nutritional value, and traceability (Chamhuri & Batt, 2015; Petrescu et al., 2020; van Rijswijk and Frewer, 2008; Wandel and Bugge, 1997).

Neff, Spiker, Rice, Schklair, and Leib (2019) found that the best before date is often perceived by consumers as an indicator of freshness, while the expiration date and use by date are associated with food safety. Consumers’ perceptions of food quality and food purchase requirements may also be guided by their social, cultural, economic status and demographics. Baiardi, Puglisi, and Scabrosetti (2016) found that older people and women were more interested in food quality, while parents...
emphasized safety. Workers, on the other hand, considered price more than quality. Consumers may also link food quality and safety, with safety seen as an integral part of food quality. However, food quality is given more attention than safety (van Rijswijk & Frewer, 2008).

The presence of certain ingredients or substances may also influence consumers’ perceptions of quality. In their study of dairy consumers, Brockman and Berry (2011) found that consumers automatically associate additives in foods with harm, regardless of whether they are aware of the benefits. In their study, consumers believed that additives in dairy products reduce quality and, therefore, should be reduced. Genetically modified foods are also seen as undesirable, with consumers preferring foods that have not been genetically modified, as well as organic products (Bellows, Alcaraz & Hallman, 2010). Pesticides are also considered to reduce the quality of products (My, Rutsaert, Van Loo & Verbeke, 2017).

A research study by Stanton (2018) found a correlation between labels, stating that the farm is committed to not using hormones, and consumers, more likely to buy food with such labels. While locally produced foods were met with skepticism in the past, consumers now express a need for the availability and accessibility of such foods (Bord Bia Insight Center, 2020).

Animal welfare is also important to consumers. Mayfield, Bennett, Tranter & Wooldridge (2007) conducted a study with British, Italian, and Swedish consumers and found that almost all respondents believed that animals could feel pain, and that eating animal products from animals with a bad life is wrong. The majority of the study participants also expressed their preference for free-range animal products, and stated that treating animals well is essential. Same findings from Lagerkvist and Hess (2011), who reported that consumers consider animal welfare as an ethical issue.

A preference for organic food has also been noted (Bellows et al., 2010; Dumortier, Evans, Grebitus & Martin, 2017; Lee, 2016). The decision to purchase organic food has been associated with health, nutrition, taste, environmental considerations, and situational factors such as the presence of children in the household (Dumortier et al., 2017; Lee, 2016). Consistent with purchasing locally grown produce, younger and more affluent consumers were more likely to purchase organic foods (Dumortier et al., 2017). However, organic certification does not always inspire consumer confidence and influence purchase frequency, nor does it predict willingness to pay more for certified products (Dumortier et al., 2017; Xu & Wu, 2010). Willingness to pay for certified food is related to income, age, education level, gender, consumption level, and awareness of traceability (Angulo & Gil, 2007; Lagerkvist & Hess, 2011; Xu & Wu, 2010).

### 2.4. Information Systems Usability

"IS is a set of interconnected components that link, process, shop, and distribute data and information and provide a feedback tool that satisfies a purpose." (Stair and Reynolds, 2016, p. 4). In this context, the authors define networks as “computers and devices that are interconnected across different places to enable electronic communication.”

Albers and Still (2011) argue that the usability of a system means how well a person can use a system to accomplish their task and describe the 5Es of usability: effective, efficient, responsive, fault-tolerant, and easy to learn. (Beynon-Davies, 2013) argues that IS mediates between technology and
activity and describes usability from IS in DeLone and McLean’s (1992, cited in Beynon-Davies 2013, pp.275-277) model, where usability consists of use and satisfaction. The definition of usability depends on the activity system and the purpose it is intended to serve.

Social interaction is supported by different categories of collaborative systems and social software. These systems need to satisfy multiuser requirements and are characterized by complex scenarios that support these requirements in the given domain. This complexity is often reflected in the UI that has evolved from command line interfaces to the established and proven use of direct manipulation techniques of windows, icons, menus, and pointers (Bourimi et al., 2012). Improved interaction capabilities built into these environments for manipulating shared artifacts could significantly support rapid and efficient decision-making in these knowledge-intensive situations, especially for geographically distributed collaborating teams.

According to Joshi et al. (2019), organizations can benefit from using IS to reduce response time to market demands, which relates to both system and user performance. This can be achieved through a design that considers users’ physical and physiological characteristics, the tasks they are likely to perform, and the environments in which they are. Consequently, usability directly or indirectly influences and determines the time it takes users to decide or take action. Therefore, Joshi et al. (2019) argue that it is essential to evaluate usability factors.

2.5. Communication Tools and Human-Computer Interaction

We are in the "Third Wave" of human-computer interaction, triggered by the expansion of the context of HCI far beyond the workplace, according to Filimowicz and Tzankova (2018), and the expansion results from the increasing pervasiveness and ubiquity of computers in daily life. The Third Wave places a stronger emphasis on human values, meaning-making, situated knowledge, and experience. Compared to the second wave, where collaborative, mediated and distributed applications in environments required a higher level of system user participation. The first wave was based on model-driven cognitive science and human factors methods and focused on rigorous, formal guidelines based on systematic studies and testing. The third wave is characterized by a growing interest in design that considers the full and messy context of socially situated and embodied action. It brings humanistic and social science considerations to design research. The earliest work in HCI was based on the concept of human-machine coupling, which expanded to include workplace collaboration as computers became more prevalent in the professional world. Today, HCI can be associated with more and more aspects of the human experience, as we can find applications to almost every aspect of daily life. (Filimowicz and Tzankova 2018)

Designed communication and collaboration tools influence the ability to collaborate and achieve common goals within a team, organization, or other groups of people. The degree of interactivity, social cues in the interface, and mobility of the communication technology are just a few of the design dimensions that influence use in different contexts. Design is often the starting point for behavior. People will often quickly repurpose communication technologies to meet their specific needs. The social design perspective of technology reflects the idea that the tools designers create do not determine exactly how people use them, but rather interact with human goals as the technology co-evolves (Shneiderman et al. 2018).

Ultimately, we expect computing devices to be wirelessly connected and computing power to be distributed in the cloud. We expect to be able to use communication channels that are open to us
virtually. We expect to be able to carry them in our pockets or purses. Information applications and location services are fundamental to this generation. In contrast, we use them to connect with others (Norman and Kirakowski 2018).

### 2.6. Aesthetics in Interaction

The esthetic perspective is a fifth interaction perspective, as described by (Morton & Simon, 2003). Their perspective is inspired by the work of Dunne (1999) and Gaver (2003), who argue for a focus on the esthetics of use, and by Djajadiningrat (2000), who views esthetics and interaction as intertwined concepts, emphasizing, "Do not think beauty in appearance, - think beauty in interaction" (ibid., p. 132).

The esthetic perspective considers how we can design an emotionally charged interaction (Wensveen et al. 2000), and how we can create engagement, experience, surprise, and magic in interaction with artifacts and interactive spaces.

(Morton & Simon, 2003) argue that it is essential to emphasize the perspective of esthetic interaction in order to highlight the experiential elements of interaction with computer artifacts, i.e. the concept is not only concerned with visual and tactile qualities of an artifact, but is an attempt to focus on the esthetic relationships between physical artifacts and their use to control computer systems.

The phrase “aesthetics in design” is often associated with the beautiful appearance of a product, a stylish color scheme, or a delightful surface texture. It is also often seen as a way of expressing a socio-cultural message, such as a particular lifestyle, through form and material (Muller, 1997). Such notions of aesthetics have a solid and fruitful tradition in design, but the field is changing. Products are becoming more connected, adaptable, context-aware, and proactive, as Aarts & Marzano (2003) envisioned. In addition, we are increasingly integrating such ‘smart’ technologies into our everyday lives.

The interaction between humans and products or humans and systems is based on reciprocity, with multiple parties behaving and influencing each other. If a device behaves in a certain way, a human can respond in a certain way and vice versa. Aesthetics should consider this interaction because a beautiful product is of little use if it causes unpleasant, inappropriate, ugly, or even inhuman interactions.

Finally, a paper by Verbeek (2005) on Technological Mediation shows that the way a device behaves influences a person’s response to that device. Ling (2004) vividly describes how the introduction of mobile phones, for example, has changed the way we manage our social relationships.

### 2.7. Interactivity and Graphic Design

Interface design is not only about the "look and feel" of the screen components, but also about the ergonomics of program control by the user. This includes practical considerations, such as placing related devices close together so that the user can easily switch between them. The entirety of the UI is that it shapes the user’s interactions - what they can do and how they do it. What the user sees and hears is only one manifestation of the "inter" activities (Nelson 1990). This theory is aimed to be used in the design of interface features for the prototype.
2.8. Design examples

Part of the research phase is to overview existing projects and review their objectives, strategies, and impact on users. For the purposes of this research, examples could be divided into two categories. Examples focus on sustainability by providing consumers with information on carbon emissions, fair trade, and product welfare. The other category of designs focuses on personalizing the shopping experience and providing/filtering information according to individual preferences.

Setai
Type: App
Purpose: provide carbon footprint information on consumption food in supermarkets
Designers: Edoardo and Andrea

The app aims to provide consumers with a convenient database of information about products. By scanning the goods in a supermarket, this app functions as a visual analyser of the CO2 emissions of the selected products in the consumer's shopping basket. The founders of the app want to provide information and allow for easy visual comparison based on the CO2 emissions of specific foods to calculate the health goals of the shoppers’ overall consumption. The app aims to help consumers make more conscious and sustainable decisions about climate change, drawing on their extensive research into the impact of CO2 emissions from the food industry and climate change.

This design example demonstrates: The project was inspiring for how to visualize carbon footprint information.

Figure 1. Setai App
**Blip**

**Type:** scanner in grocery store, a Bachelor graduation project  
**Purpose:** provide customers with information to facilitate sustainable decisions  
**Designers:** Felicia Evaldsson

This project looks at how to facilitate consumer decisions related to health and environmental impact on various commodities in a physical grocery store. The designer's focus was on interaction with consumers; the project resulted in an attached interactive system installed in scanners in the grocery store. The scanner is planned to allow the information to be transmitted to phones in the future. The graduation project has been done in collaboration with COOP and the Techno creatives.

This design example demonstrates: The study support with previous studies of product labels, health information, and environmental data. The result was suggestive on how to provide such information during shopping.

![Figure 2. Blip In use](image_url)
Discover

Type: App
Purpose: Tracing carbon footprint and supply chain of Seafood products
Designers: BioMar Group

Sustainable aquaculture feed provider BioMar has released a free smartphone app to track the supply chain of fishery products. The app, called Discover, is available to consumers. The app provides transparency into all BioMar activities. With the Discover app, users can scan seafood codes QR and receive data on the products, including the type of feed used, the product's carbon footprint, seafood origin, certification, water usage, and nutritional information. The data is updated when conditions, such as feed recipes and raw materials change. Norwegian salmon producer Kvarøy is the first to sign up to participate in the program.

This design example demonstrates: An inspiration on how producers wish to cooperate and provide data to consumers to enhance transparency using QR technology information.

Figure 3. Discover App
Seedling
Type: App
Purpose: Creating a more niche grocery shopping experience
Designers: Erika Harano

Many online grocery shopping platforms in the market aim to provide busy people with a time-saving and cost-effective way to shop for the groceries they want. However, online grocery shopping often does not allow customers to choose their own fresh produce. In addition, many online grocery services do not provide adequate support for people with special dietary needs. For example, customers with gluten allergies, vegans, Paleo customers, and customers who only buy local organic produce often do not find precisely what they need when shopping for food online. This project proposes a research-based shopping experience for specific dietary needs.

This design example demonstrates: In addition to learning how online shopping differs from physical shopping, this project inspired my research on how consumers search for their desired products and how we can provide them with the information they need.

Figure 4. Seedling App
3. METHODS & METHODOLOGY

In this section, you present the methods applied in the project. You should provide reasoning behind your choice of design methods and techniques appropriate for advanced-level design work.

3.1 | Literature reviews

Literature reviews can be a fundamental part of design research to understand and gather knowledge of the critical issues on a particular topic. It can act as a basis for the development of knowledge, create design guidelines, provide evidence of impact, and, if well conducted, can generate new ideas and directions for a particular field. As such, they serve as a foundation for future research and theory. In its most comprehensive form, a literature review involves a synthesis of quantitative findings from quantitative research studies and qualitative findings from qualitative research studies. (Hannah Snyder, 2019).

This method can be described as a structured method for collecting and analyzing previous research findings (Baumeister & Leary, 1997; Tranfield, Denyer, & Smart, 2003). By integrating findings and perspectives from many empirical findings, a literature review helps answer research questions.

A literature review aims to gather knowledge about areas where research is inconsistent and interdisciplinary. In addition, a synthesizing literature review is a way to show evidence at a meta-level and reveal areas where further research is needed, which is a critical component for building theoretical frameworks and conceptual models. (Hannah Snyder, 2019).

According to (Martin & Hanington, 2012), The selection of literature to be reviewed should be relevant to the project and demonstrate how it has influenced or assisted the design investigation. Also, literature reviews should be accurately referenced using consistent footnotes or endnotes.

3.2 | Interviews

The goal of designers seeking to understand people is to assist them find solutions to their problems by creating artifacts, and to do that; you have to interview the user about it (Kuniavsky, 2003). Therefore, the knowledge gained from the interview is used to find ways to guide and derive the research direction.

The interview is an appropriate method for gathering information. It has its natural basis in human conversation and allows the researcher to adjust the pace and style of questions to get the best out of the interviewee. It can be a very convenient method of gathering knowledge, perspectives, and opinions from targeted users. It also has the advantage of providing answers in the way that respondents think and use body language, and that can be important if you were to study how respondents see the social world that we want to study. (Martin & Hanington, 2012)

Moreover, interviews may follow a structure. And as it is described by (Kuniavsky, 2003) whether an individual or a group of users, the interview should have a similar structure of understanding. A disadvantage of structured interviews can be perceived as formal and less personal, but on the other hand, can be easier to control in terms of questions, timekeeping and are easier to synthesize.
Although (Martin & Hanington, 2012) argue that unstructured interviews may have the advantage of being more conversational and comfortable for participants, the researcher should guide the conversation and gather the knowledge needed within the time.

In order to achieve good results from an interview, some preparation must be done beforehand. A standard interview process can be done in six phases which goes from introduction to, warm-up, to general issues discussion, to deep focus, to the retrospective, and at the end wrap-up (Kuniavsky, 2003). Also on an important aspect that (Kuniavsky, 2003) mentioned banning leading questions from all socializing research as they will inject the prejudice of the researcher into a situation where it should be about the user perspective who is answering the question.

3.3 | Observations

Observation in design is a qualitative research technique in which researchers observe the ongoing behavior of participants in a natural situation. Depending on the type of observational research and the study’s goal, the researcher is involved in the study to varying degrees. The researcher should differentiate between observing the behavior, and speculating the user motivation behind actions. And as described by Martin & Hanington (2012) “the observation is a fundamental research method, which requires attentive looking and systematic recording of phenomena – Including people, artifacts, environments, events, behaviours and interactions” (p. 120).

Martin & Hanington (2012) recommended that observation be systematic, thorough, and well documented with notes, sketches, photographs, or raw video footage. The results of the observation and the documentation materials are usually summarized and used as inspiration for the design; however, more in-depth qualitative analysis, such as contextual analysis, may be conducted to uncover new user patterns or demonstrate an influence on user behaviour.

3.4 | The Lotus Blossom Creative Technique

A creative thinking technique that will help the researchers expand their thinking beyond their usual thinking is Lotus Blossom. This method was invented in Japan by Yasuo Matsumura. According to the author Michalko (2003, p. 3), Lotus Blossom helps you organize your thinking around significant themes, which could help you explore a range of alternative possibilities and inspirations.

The lotus flower technique focuses on the power of brainstorming on areas of interest with a specific theme. It does this by using a visual representation of ideas. You start with a central idea or theme and then iteratively expand outward with solution areas or related topics. The method urges you to have a fully discussed topic before you consider it complete.

It is recommended to carry out the method with more than two participants (Breiler and Michanek, 2014), as it is an interactive method that aims to optimize communication, with a view to encouraging discussions that may arise within the group.

The use of Lotus Blossom Technique in intersecting blocks to generate ideas, and was not limited to having a one-way expansion of ideas to begin thinking. On the contrary, it would generate more innovative and flexible directions for design research. Therefore, finding connections of blocks to other blocks from the frameworks to find the appropriate use was the most influential factor to generate the most common design direction for researchers to construct their next research steps.
3.5 | User journey mapping

Martin & Hanington (2012) described user journey maps as follows: "A user journey map is a visualization of the activities users have when interacting with a product or service so that each moment can be individually evaluated and developed." The method helps create artifacts about the journey a user takes to complete a task. The key to this method is verbal interaction and prompting by the researcher that transforms understanding about how a user moves through space into why a user approaches a task in a certain way (Kolko, 2014). The process of creating the mapping is essential to this transformative understanding (Risdon, 2013).

As recommended by Joe J. Marquez, Annie Downey & Ryan Clement (2015), the workshop leader should provide the user with various media to document the steps, including sticky notes, blank sheets, notepads, a whiteboard, or even just verbally walking through the journey. After asking the user to outline the steps they are taking to accomplish a particular task. At this point, the user describes the method of completing the task by drawing it, describing it in text, or creating a mosaic with a sticky note for each step. The user should be encouraged to use whatever description method and tool they feel most comfortable with. Sketching the journey in this step-by-step manner allows the research team and the user to "externalize thoughts into physical engagement" (Hinton, 2015, p. 46) and turn thoughts into diagrams and actual steps, with the user using a sticky note to record where they are having difficulty and re-emphasize them in the moment of the journey. These particular moments evoke strong emotional responses and are ripe for redesign and improvement (Martin & Hanington, 2012).

Joe J. Marquez, Annie Downey & Ryan Clement (2015) also recommended digging deeper by asking the user "why," which allows the research team to arrive at what Clifford Geertz calls "thick description" (Geertz, 1973, p. 6). Knowing what is on the surface is not enough to understand habits and motivations. The questions of WHY go deeper and point out behaviours that the researcher needs during his research. This helps the researcher develop a vision of how to complement existing user behaviours more effectively in their actual context of use.

3.6 | Questionnaires

A questionnaire is a research tool consisting of a series of questions to gather information from respondents. The questionnaire is a survey instrument used to collect self-reported information from individuals about their characteristics, thoughts, emotions, perceptions, behaviors, or attitudes, usually in written form, that helps collect reports or statistics of facts, attitudes, and other subjective states. (Martin & Hanington, 2012). Questionnaires are one of the primary instruments used to collect survey data, the other being interviews.

Martin & Hanington (2012) recommended paying attention to the survey wording and the response options, sequencing, and length. Also highlighted the need for survey description with good clarity, appearance and layout will help participants to understand the survey easier.

Open-ended questions offer the opportunity to provide in-depth answers, whereas closed-ended questions are easier to analyze and communicate numerically - to maintain the neutrality of the question while indicating the strength of the answer, Likert-scale questions are highly recommended. One advantage of online survey research is that it uses the power of the Internet to gain access to groups and individuals who would be difficult or impossible to reach through other channels (Garton, Haythornthwaite, & Wellman, 1999; Wellman, 1997), such as the time of COVID-19 which a physical meeting is not advisable.

A second advantage is that Internet-based survey research can save researchers time. Online surveys allow the researcher to reach thousands of people with different or same characteristics in a short
time, even though they may be separated by large geographic distances (Bachmann & Elfrink, 1996; Garton et al., 2003; Taylor, 2000; Yun & Trumbo, 2000).

3.7 | Cultural probes

One of the newest techniques in Human-Computer Interaction (HCI) is a mechanism to collect data called Cultural Probes. This method was introduced in 1999 by William Gaver, a researcher at London Royal College of Art, in the publication Interactions (Murphy, 2006). According to Martin & Hanington (2012), Cultural probes can be described as a tool that provokes the users’ thoughts, which will help the researcher perceive a better understanding of user lives, environments, thoughts, and interactions. In addition, cultural probes aim to prompt and collect information from targeted users about their lives and local culture, which could serve as inspirational pieces identifying key patterns and themes that might emerge from a participant group or culture into the design process.

Cultural probes can be done in many ways; for example, the user can be asked to create a diary about their daily life and address a specific situation in their everyday life, and that will offer the user the opportunity to document their life in their context, with minimal interference from the designer. (Murphy, 2006). Furthermore, since this method allows the user to capture their actual behaviour, the researcher will gain largely unbiased insights from their perspective, making cultural probes particularly valuable for an early inspiration phase.

3.8 | Sketching

Sketching is a distinct form of drawing that we designers use to propose, explore, refine, and communicate our ideas (Buxton, 2011). As a UX designer, you can use sketching as an initial starting point to crack a design problem.

As Buxton argued (2011), the sketching process can involve various materials - from pen and paper to digital tools or physical modeling. Whatever material used, Sketches should be seen as quick to make to deliver an immediate impression that can be provided when needed. "The importance of sketching is in the activity, not the resulting artifact (the sketch)." (Buxton, 2011, p. 135)

A sketch is made up of different elements or a sketching vocabulary. The process of storing the sketching vocabulary will help draw the sketches quickly and increase the reusability of ideas. In addition, collaborative sketching can improve outlining ideas. The use of various tools to create digital sketches is also encouraged by Buxton (2011).

He argues that rapid and low-quality sketching can genuinely afford to play, explore, and learn because of the low investment in the process. While "too much concern for quality too early may well have a negative effect." (Buxton, 2011, p. 139)

For example, sketches with sticky notes is also possible and it has some advantages over illustrations with a pencil. For instance, we can replace sticky notes easily with the new idea instead of changing/redrawing a whole sketch. Template and photo traces can speed up the design process and capture ideas from existing work. Buxton also mentioned that sketches should "suggest and explore rather than confirm." (Buxton, 2011, p. 113)

3.9 | Prototyping

Prototyping is a fundamental phase of design and, as described by (Ulrich and Eppinger, 2008), a design tool that approaches at least one aspect of the product. However, the precise definition of what a prototype is can diverge significantly among design disciplines. For example, a physical foam-
core model may work as a prototype for an industrial designer, whereas an interactive simulation is a commonly used prototype of an interaction designer. Although, the importance is not what media or tools are used to construct the prototype, but how designers use them to investigate or express some aspects of the future artifact (Houde and Hill, 1997).

A triangular model of prototype organization for user interaction design created by Houde and Hill (1997) provides a method for evaluating prototypes (see Figure). Their model requires designers to focus on three questions: What role will the prototype play in a user’s life? How should it look and feel? And, how we can make it work? These questions guide the designer to focus on the purpose of the prototype to make better decisions about the type of prototype to create. Thinking about purpose also helps users provide more productive feedback (Houde and Hill, 1997).

The degree of fidelity or completion determines the design prototypes. Low-fidelity prototyping is common in early ideation processes and emerges as a concept idea. However, low-fidelity prototypes are an excellent tool for early hypothesis testing with users in generative research. At this stage, the product is seen as a proposed concept for constructive review and timely feedback for future modification.

A standard method for low-fidelity prototyping in interface and software design is paper prototyping. As the prototype is used with users, problem areas or positive reactions are documented, sometimes directly on the paper prototype with annotations or code.

![Figure 5. A model of what prototypes are by Houde & Hill (1997).](image)

### 3.10 Usability Testing

Usability testing is essential when designing a user interface, as this method focuses on people and how they perform tasks, and looks for empirical evidence on how to improve the usability of an interface. (Martin & Hanington, 2012).

Usability testing described by Martin & Hanington (2012), as an evaluation tool that allows designers to observe their target group/user’s experience with a digital application as they go through the steps of a particular task (or set of functions). The method is intended to help designers identify the pain points of the user interface that could cause frustration or confusion to be prioritized, fixed, and retested before deployment.

As recommended by (Martin & Hanington, 2012), testing should be designed around the particular goals of the end-user using pre-designed tasks and scenarios. Tasks should be clear and accurate, reflecting the actual goals of the target audience. And scenarios contextualize the task and are formulated to contribute with additional knowledge required to complete the task. Tasks and scenarios should not influence the participant to solve a problem in a particular way.
3.11 Project plan

The project plan is inspired by Double Diamond's model as the design process goes through four main phases that require convergent and divergent thinking. However, the design process is very much focused on user feedback to adjust intentions after initial investigations.

The process began with literature reviews to gain more knowledge about the topic and the state of the field. The discovery and synthesis phase went in a loop because the subject was broad.

For this reason, this part of the diamond went through converging and diverging phases until the final design direction was reached. The process focused on user insights to understand the people we were designing for which could help us find solutions. (Krogh et al., 2015)
Each method was selected and modified according to the goal of the exploration and was intended to help gain more insights from users, which helped synthesize the information and evolve the process as you can see in figure (7).

<table>
<thead>
<tr>
<th>WHAT IS TRANSPARENCY</th>
<th>CATEGORIZE TRANSPARENCY</th>
<th>WHEN AND WHERE NEEDED</th>
<th>REACH OUT &amp; WHAT INFLUENCE</th>
<th>HOW USER HANDLED TRANSPARENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal: Broad research about transparency</td>
<td>Goal: categorize and choose a direction</td>
<td>Goal: Explore when and where transparency is needed during the partnership process</td>
<td>Goal: Reach out to more users and learn about what influence the need for transparency</td>
<td>Goal: What steps are taken to find the information needed, and how much information does the user want about transparency?</td>
</tr>
</tbody>
</table>

Figure 7. Research methods

**Develop and Deliver**

At the beginning of the project and after each exploration phase, I created ideas and outlines for brainstorming, documentation, and reflection. In addition, these sketches served as the basis and inspiration for prototyping. The ideation workshop was then held based on these small ideas to build upon.

I use digital prototyping to develop an interactive artifact using Figma and Illustrator that incorporates the key findings from the exploratory phase. The prototype will be tested on-site with three students and online with three individuals. Based on the feedback, final corrections will be made to the prototype. In addition, direction for future improvements will be determined.
4 DESIGN PROCESS

Project formation
At the beginning of the exploratory phase, research focused on gaining insights into consumers' purchase motivations and how transparency of product information can influence consumers' decisions. This first design phase supported the construction of project formation, as the results helped create the research plan, formulate the research questions, and structure a design process with methods. This research phase was conducted through literature review and observation. The researching and reading of articles about transparency demand during the literature review helped establish the chosen topic's credibility. In addition, literature reading went through the whole project for knowledge support (see chapter 3.1). The observation was conducted for five users in ICA and COOP grocery stores in Malmö, Sweden. The observation aimed to gain insights into local consumer behaviour by observing some users during their regular shopping. In addition, hypotheses were made about the different segments of grocery shoppers. The Consumers that I observed were interviewed afterward.

This information gathered at this process stage can be considered first-hand understanding and inspiration about the thesis topic. In addition, the insights served as a base material on which to build throughout the overall project. Furthermore, support with information to start the first workshop (value workshop) with the users to discuss transparency and its meaning.

The documentation of this phase was through different tools, such as highlighting and summarizing what articles are related to the topic and mainly literature discussed the demand for transparency and gathering quotes as an inspiration. Another tool used in the process was taking pictures of today's products presented at grocery store shelves, filming users during the observation.

Insight's summary:
- Consumer categories: the "economic consumer" pays attention to price, product assortment, and quality. The "personalizing consumer" seeks social relationships with retail personnel. The "ethical consumer" is concerned with moral issues and is willing to give up lower prices or a more comprehensive range of products to help small retailers. Finally, the "apathetic consumer" shops out of necessity and is not concerned with shopping.
- Behaviour in the store: some consumers have prepared in advance for their purchases. Another type of consumer must classify the available alternatives for grocery shopping and indicate why they like or dislike the various alternatives. Also, the attraction to discount plays a role to navigate in the store where consumers observe quality and product information to decide.
- Choosing products: The use of physical sensation to choose products is a common tool for consumers such as holding the product close to their eyes in order to read ingredients or checking weight of the product.
- The time spent selecting products ranges from (5-30 seconds MAX). The maximum time is when the user is presented with the same product but different brands. The delay is due to confusion.
- If a user is confused about a product’s information and label, they will most likely not buy it (4/20) and choose a more expensive product brand that is more well known/more reviewed, because they trust it more (12/20).
What Transparency Means to consumers? (Value workshop)

After conducting desktop research and gathering information about the demand for transparency in general, I wanted to gain fresh consumers' perspectives to have a deeper understanding of their needs, values, and concerns about transparency in today's grocery shopping experience. To this end, I planned two online workshops using prior knowledge and material from the literature review and observations.

The workshops were designed to be conducted online with the participants using Miro and Zoom for two hours. In total, there were two workshops, each with a different target group: on the one hand, students with a fixed budget and, on the other, users who have a secure income, for example, having a job or their own business.

The focus of the workshop was to:

- Investigate what transparency means for the consumers today and create a common definition between the participants.
- Have an insight into what values transparency brings to the individual and the grocery shop in return.
- Create an open discussion about the participants' chosen transparency differentiation and values. Then let participants clarify their perspective and reasoning for "why they chose a specific meaning of transparency and how it relates to them."

The literature research findings and the documented material from the observations were presented to the participants before starting the workshop. The use of this document's aim was to situate the participants with the current shopping experience and put them in the shopping mood.

The workshop dynamic and structure were based on the Lotus Blossom method (See chapter 3.4). And the core theme was (Transparency). The workshop begins by asking participants what transparency means to them according to grocery shopping, with 10 minutes to reflect. After everyone has written down their perspective, we begin to group them into subtopics (see figure XX). Then participants begin to discuss and write down their perspectives on why each subtopic is essential and has value. The workshop ended with a discussion about the transparency topic in general and how it could affect our behaviour as consumers, below is a summary of the results I carried to the next research method:

- Transparency between consumers and grocery stores could mean:
  - Clear products information:
    - According to ingredient
    - A visual representation for material could help
    - What is the difference between ECO and not ECO products from a personal health and sustainability perspective?
    - Easy search for relevant information.
    - Organic Vs sustainable. Will the consumer help with being more sustainable for buying more organic food?
    - More information regarding meat.
  - Showing products origin:
    - Is there a way for customers to trace the production process of these products?
    - Working conditions: Conditions for food production workers vary around the world, producers can assess the risk of poor working conditions.
  - Sustainability & animal welfare information
    - Carbon footprint information.
    - Meat products sustainability
- Biodiversity risk
- Greenhouse gas emissions. What are the climate impacts of production and how are they communicated to consumers?
- Fertility Information: Inorganic produce requires fertile soil to produce high and consistent harvests. This requires soil organisms such as fungi, earthworms, bacteria, and other life forms that convert organic matter and break down minerals. How does this affect the sustainability statement?
- Pesticides used on products: the use of foreign chemical pesticides may pose a risk to humans and the environment to which they are exposed. How to communicate to consumers the amount used, and the risk involved.

- One conclusion drawn during the workshop discussion on the relationship between consumers and food was that this type of relationship could be lost or reduced as consumers feel that products simply appear on store shelves.
- The consumer demand for transparency could stem from the need for (inspiration, product facts, specific product information, product origin, packaging information/formulation of ingredients and stories behind the packaging).

**Insight's summary:**
The process helped narrow the definition of transparency and set the direction for communicating product information, focusing on carbon footprint and health. It also considered how the information provided could be simplified so that consumers could more quickly perceive and read the information they wanted in the store. Finally, one conclusion from the discussion on why information needs to be simplified was that: "the easier and quicker product information is to read, the more informed decisions we as consumers can make on the spot".
Where and When during the shopping process, Transparency missing (User journey mapping)

After exploring what transparency might mean to consumers today, it was time to explore and gain insights into when and where transparency is needed during the consumer shopping journey. To this end, I planned a Consumer Journey Workshop (check chapter 3.5).

The workshops were conducted with nine participants as individual workshops (one-to-one). During the workshop, we used a collection of materials such as crayons, papers, tape, etc. with each participant for about 30 minutes. In total, there were nine workshops, each with a different target group: on the one hand students with a fixed budget and on the other hand users who have a secure income, e.g. through a job or their own business.

The focus of the workshops was to:
- Map the shopping journey and determine when transparency is needed by creating consumers’ journeys with the users. (Pinpoint the consumer pain points)
- Have insight into how consumers make an informed decision, and how their decision is affected when information about a product is ambiguous or missing.
- Investigate if there are any rituals before or after the shopping journey that the user does.

The workshop began with a short interview with the participants to learn more about their age, occupation, and brief information about their lifestyle and motive for purchasing. After that, participants were asked to recall a day when they were shopping. During the workshop, I asked participants to think freely about when they felt they needed to shop, and we went from there. Some users draw on paper, others prefer me to draw while they describe their journey. After the user finished their journey, I would go over the journey and explain what I understood from their words. This way I could make sure I got most of the information the user wanted to share, and I gathered the right participant perspective.

Throughout the workshop, I kept asking the user about the reasoning for their actions (asking the five whys), and we also registered some feelings and emotions they had during the journey. In the end, the user and I discussed what other activities the user is doing to collect/share or discuss product information and what events might be happening. For example, some users would be curious to learn information about other people’s food over dinner or another case when consumers share hair product information.

![Figure 9. Results from individual workshop](image-url)
Workshop materials (User Journeys) were documented and evaluated after each workshop. (See Appendix 1 for details). After synthesizing all the information, a general user journey mapping was created based on the insights gained from the users, as shown in Figure (10). The general mapping helped to converge the focus of the research by summarizing and highlighting key findings from User Journeys: User Actions and Thoughts, Touch Points, Feelings, and Opportunities for Improvement.

The workshops benefit the research with three main outcomes:

- Have an insight and map out a general shopping journey for the user
  - **Before shopping routines:**
    - Planning: make a list on paper, by phone, or keep it in your head. Read online to check for ingredients and some users become influenced with news about products and sustainability news.
    - Depending on: price (discounts matter), events or desired meals.
    - Touch points: phone, paper, checklist app, eye observation.
    - Opportunities for improvement:
      - The design can be involved during the planning to reduce the stress at the shop.
      - Knowing what is in the market in advance can help with shopping plans.
  - **During the shopping:**
    - Observation: consumers are attracted by the sale or use their senses to test the products (smell, touch, etc.).
    - Reading information: The amount of information on the packaging and how it is presented plays an important role. Also, some products have only Swedish information, and some users are international. Low satisfaction level for sugary products as consumers have to spend time reading and calculate the information.
    - Missing/requested information: on organic and non-organic products, pesticides, carbon footprint, and reasons for pricing.
Moments of confusion: when there are too many products of different brands and only the price is different. Food labels/tags are not clean or are not explained in the store. Origin of products.

Touch points: phone, paper, checklist app, eye observation, products, store signs and workers at the store.

Opportunities for improvement:
- Filtering information for quick reading according to user needs.
- Asking for missing information via a platform with an explanation of the information received.
- Better labelling/tag system

After shopping

Satisfaction moments without knowledge of the complaint procedure (the user does not feel guided or sometimes the price of the products is not worthy of a complaint).

Social media influence: documentaries and health club membership can influence food choices.

Touch points: phone, social media platforms, other people

Opportunities for improvement:
- Sharing frustrations with others to avoid making the same mistake with other users. Also, inform the manufacturer and shop of a mistake.
- Give stores the opportunity to explain their point of view on sustainability, and similar cases might appear on social media or other platforms.

These findings served as inspiration for the ideation phase and helped define the design direction. And finally, some of the material was also used for the next exploration method (questionnaire), as I used some quotes from users and other findings to ask questions and open a discussion.

Questionnaires:
After gaining insight into the consumer buying process and the pain point of the journey for today's buying process. I wanted to deepen my understanding, gather statistics, and validate/confirm my findings with other users (for example: citations from journey workshops used to start discussions and validate opinions from more users). The statistics would help prioritize the information gathered and provide final direction. For this purpose, I planned online questionnaires (see chapter 3.6).

The survey was answered by 57 consumers. Detailed information can be found in the Appendix (2). Here is a summary of the main findings:
- 60% of respondents do shopping more than once a week.
- Shopping planning can be mixed with phone or paper and users carry their phone during the shopping process.
- As discount plays a role for the consumers shopping, they wish to have more information about the reasoning behind it.
- 86% of consumers wish for a quick answer about products at the store. 43% of consumers had to google products information while at the store.
- A choice to use a digital tool in order to have a n option to access more information when needed.
- A confirmation for the thesis direction
Cultural Probes

After gaining insight into the consumer buying process and the pain point of the journey for today's buying process, I wanted to deepen the understanding of the information gathered during the user journey workshop and learn about the user's perspective after gaining access to information about products that is not listed on the packaging but requested by the consumers from the research findings. And reflect through their own documentation of the process. To this end, I planned Cultural Probes (see Chapter 3.7). User responses and feedback documentations were informative about how consumers prefer to be exposed to such information and the amount of information that should be provided to consumers.

Details:
The Cultural Probes were designed to get the user to document their purchase in multiple stages. Here is a summary of the stages and their motivation of each phase:

**Stage one (2 pages)**

Page one Task: Consumers are asked to document a shopping experience from beginning to end. In this documentation they are to share and reflect on excitement and moments of frustration. Also document what information they were looking for each product bought and what were missing.

Page two task: come back to the probe after 2 days and reflect on the products purchased. Provide feedback on whether the purchase met expectations or if they were disappointed with some of the products.

The motivation was to learn more about how consumers reflect about disappointments/upsets and how they will react to the same products in the future.

**Stage two (2 pages)**

Page one Task: Consumers are asked to document and reflect when they have made a decision about an imported product (vegetable or fruit). This page included some questions about whether consumers care about sustainability information and whether they know about pesticides. Also document what specific information they were looking for when they chose the product bought and what was missing.

Page two task: The second page is intended to stimulate users with information about pesticides and how to handle products that have been treated with pesticides at home, as well as information about the carbon footprint. As you see in figure (x). The information was optional as it was encoded in QR and the user had the choice to see the information or not. The QR was designed to be scanned by phone and direct the users to related information pages according to the stage topic. If the user chooses to review the information, the user is asked to reflect on whether the information was helpful.

The second half of the page the consumer requested to shortly share their shopping experience (that has been done after finishing stage two). Mainly what has changed after reviewing the information.

The motivation was to learn more about whether the user was interested in learning more about carbon footprint and pesticides. It was also to find out how users' behaviour and experiences change after they have gained access to such information. The material will also be used as inspiration for the ideation phase.
Stage Three
The motivation for the third phase was to learn more about whether information about sugars in products can change consumers' perceptions of what they are buying. Another important motivation was to find out how social media influences consumers’ curiosity about information and the originality of products.

A second focus of this phase was to learn more about how consumers would like information about sugary products to be presented graphically. In addition, this phase served as inspiration for the ideation phase.

Stage Four (1 pages)
This was the final stage of the probes. In this stage the users were asked to investigate an answered question they had about a product they bought or any concerns they had about it. They were asked to track each step they took to achieve their goal of knowing/learning what they wanted.

The motivation was to learn and follow the steps users need to take today to find out about a particular product or to make a complaint. This stage was a main inspiration for the ideation phase.

Outcome summary:
Disappointments about products are usually shared with other household members. Users try to remember it the next time they buy the same product (which they do not always succeed in doing). Consumers also share product disappointments with friends when they have been shopping with them. The phrase "I wish someone had told me that before I bought it” is a common theme when product information is shared, and the other person had the same problem.
Participants like having access to information about carbon footprints and pesticides. However, they do not want the presentation through videos or information that may interfere with their shopping experience. Instead, they would like the information in the form of pure numbers or information that helps them survive the chemicals rather than how deadly they are. Participants wished for news about products in general, such as research or documentation, to be collected in one place instead of having to research on different platforms. The process the consumer must go through to investigate a product or file a complaint has always been a dead end. “The store is unreachable.”

4.2 Problem definition

Both quantitative and qualitative researchers came to similar conclusions regarding pain points. These include difficulty for the consumers for analysing product information in-store or getting the data they want quickly, a lack of feeling free to customize perceived data, connection to other primary data sources or product manufacturers, and finally, the ability to share feedback or complaints with the store or other consumers.

To analyse and synthesize user research findings I used Affinity Diagramming. I collected the findings from the previous activities into a pain point list and developed them into possible design criteria for the ideation process. Once the lists of pain points and criteria were created, I categorised them into four main clusters:

- Customization was the more decadent category. This often results in the need to provide the ability to customize product information to consumer preferences. Whether it is packaging information or new data.
- Simplicity, as the need for "understandable" visualization of information, simplification of information became clear. In addition, many participants expressed the need to better understand the meaning of the data presented.
- Cohesiveness, as two channels of communication are required: First, consumers tend to share information with each other and seek feedback online. Second, consumer and stakeholder communication channels.
- Accessibility: design should be integrated into the user’s routine and not appear as an extra step in the shopping process.

4.3 Develop Ideation

How might we workshop

The affinity diagram helped synthesize information and bridge the research and ideation phases, ensuring that the latter was still based on desk research and user research results. Once the pain point list and criteria list were grouped, I converted the statements in the "How Might We “questions to visualize design opportunities. And was ready for the ideation phase.

For the first Ideation phase I planned an online ideation session with two other designers. One works for Google (to have the perspective of collecting data) and the other works for IKEA to have the perspective of digitalization and as they work for the smart home department. Also, they both are experienced interaction designers which can help with the discussion of the ideas.

The workshops were designed to be conducted online for two hours with participants using Miro and Zoom. The workshop led to a few potential ideas, but each idea was focused on a specific theme:
such as Telling facts about sustainability for a product. We had a hard time synthesizing the ideas into one concept.

We went back a step and investigated the reason for this difficulty. We traced the problem back from one of the research results (culture probes), and precisely the very stage when they were trying to gain more knowledge or complaining about the product.

As shown in Figure (X), the user’s information goes through a linear process to gain knowledge or accomplish something. In addition, the flow of information was slow and not functional enough to best meet the needs of consumers. This conclusion led to the concept of creating a hub to connect stakeholders in one centre (the application platform).

**Sketching with Paper and Illustration**

Sketches of ideas went through the design process. In the early stages, when a potential concept inspires me, I document the idea and set it aside, so I do not get distracted and focus on the phase I am working on. The documentation was done on post-it notes or through small paper drawings. I placed the documented ideas on a digital Miro board on an individual frame and called it a "brain dump".

During the concept sketch, I collected the components that had arisen in the early sketching phase and associated with answering the "how could we" questions and the new ideas from the ideation workshop. Concept sketching was "quick and dirty" (Buxton, 2010). Initially, I sketched some quick and low-quality ideas that I drew on paper. Then, as the concept became more defined, I began to
sketch possible interactions using illustrator and the print and cut into pieces of paper as elements of the application frames and exploring different configurations. Finally, I began to explore which indicators were valuable, how they should be modified, and how to handle the data visualization.

Figure 14. results of hand sketching

**Co-design workshop**

After creating draft ideas, I wanted to Emerge the ideas and create more detailing for a final concept. To achieve this, I planned a Co-creation workshop (check chapter 3.5).

The workshops were conducted with four participants as group activity workshops (2 consumers and two interaction designers). During the workshop, we used a collection of materials such as crayons, papers, tape, etc.

The workshop was designed into three phases:

- **Phase one (40 min)** when I explained the process and showed the stage of my ideas to be used as an inspiration. At this phase the goal was to create the skeleton of the application and connect/Add/edit frames. The frames were not just based on the main ideas, but the participants were able to come up with their own ideas from both the consumer perspective and interaction designer perspective.
- **Phase two (15 min)** When the ideation was about how to modify the core of connecting stakeholders.
- **Phase three** was focusing on sketching the illustration for the application. This phase was the last as we can discuss and sketch.

The outcome was collected and then combined to be used in the deliver phase.

**4.4 Deliver**

**Prototype**

Based on Houde & Hill's (1997) model presented in section 3.9, I started to define the purpose of the prototype as "Look and Feel" and "Role" to visualize the focus of the exploration. Then, a low-fi version was created to evaluate the prototype with user testing to evaluate specific visualizations and features using subjective data and preliminary icons.
Before starting the design activity of the prototype, a list was created of features overview and possible interactions by combining the findings from the co-design workshop. The result includes a list of possible functions of the application:

- **Before shopping options:**
  - Check availability of products
  - Biking and driving options
  - Creating shopping list
- Scanning barcodes frames in order to collect information.
- Information priority should be what the user filtered.
- Comments and feedback tab
- Shopping planning
- Cases colour code

The prototype was made in Adobe illustrator, Figma and After effects programs.

![Figure 15. Prototyping on Figma and Illustrator](image)

**User testing**

Over all the users enjoyed using the app and we had a very insightful way on how to improve the app.

- Log in options: the user prefers to log in with their social media as they already have people, they know there such as Facebook.
- Creating personal notes for the products.
- After scanning. The users prefer to see relative first information about the product. Then what the products includes or facts.
- The carbon footprint and health should be in new tabs.
- Some visibility feedback to be adjusted.
- Some changing in frames placing and indications
- A request to simplify the pre shopping phase as a normal shopping list with just keeping checking the availability
5 MAIN RESULTS AND FINAL DESIGN

In this section, you present the result of your design process, and the final design concept that came out of it. You can refer to section 4 and mention results from different parts of the design process. You should answer the research questions that you posed in the introduction.

5.1 Main results

A tool to empower consumers
The design process results revealed an opportunity for a tool that aims to empower the consumers through their shopping journey and support their informed decision. The results serve as a proposal and open the door for design opportunities for future work. Furthermore, the prototyped application will promote and give access to products information through different categories such as carbon footprint and health information. Besides that, findings unfolded the value of connecting a user with stakeholders to request information or to report errors or demands. Finally, the application allows the user voice to be vocal and share it with other consumers for product feedback. However, the application is designed in a shopping planning application to reduce the shopping steps. It is still optional for the users to use or activate.

Curiosity driven
The study conducted showed a need to use this tool to support the user’s pre-purchase and post-purchase decision-making. Moreover, it aims to arouse curiosity for investigation by exploring data that are not usually associated with the personalized visualization in the application. Indeed, some data is not available or visualized in a way that the consumer would expect. However, it provides the starting point to begin learning about products and expand through other consumer applications.

The visualization
From the research, in order to make sense of the product’s information. The application intends to use user-friendly visualizations to make the numbers easier to understand. For example, carbon footprint is not a common language used in daily life. To make the information friendlier and easier to understand, users have the option to convert the numbers to the amount of CO2 equivalent to trees burned, car trips, flights from one city to another, or the size of a balloon. This makes it easier to understand.

Togetherness
Consumer power is effective and efficient when they work together. Nevertheless, unfortunately, today, requesting the information is used to be done individually and not shared with others. The application proposes an option for availability and accessibility for all consumers to see what others reviewed about a product or complaints. In addition, the application aims to connect the consumers with Stakeholders such as grocery stores, consumer rights organizations, and producers. Therefore, the users will have direct interaction with these stakeholders. From a stakeholder perspective, the application opens the door for manufacturers to improve by making it easier to gather feedback from users. It also makes shops’ communication with users more transparent.

Technical consideration
Most of the indicators selected include data not available yet for most products. However, some grocery stores are currently collecting and requesting information from producers that can potentially be used for application.
EVINCER
INNOVATIVE SHOPPING APPLICATION
PROTOTYPE FOCUS ON EMPOWERING
CONSUMERS AND ENHANCE THEIR
INFORMED DECISIONS.

Click to check the prototype
5.2 Details

Concept Overview

The final concept is an interactive tool that provides visualized product information and connects consumers and stakeholders.

Features

Pre-shopping experience:

Login: users can log in with their social media accounts such as Facebook or Google. This consideration came from user testing, as users already have friends and people they trust to share.

Planning: the planning feature serves as a place where users can plan their purchases, as they used to, but with the advantage of being able to check if the product they intend to buy is in store or not, check old lists, favourite’s, and recommended products.

In-store experience:

Scanning: By scanning products, consumers can access highlighted product information from manufacturers that the user filters. The information relates to carbon footprint, health, and ratings. This information aims to inform the user. They have the option to review the information on the tab or not, as this was one of the user test feedbacks. They can also review product notes from their previous purchases.
After the shopping experience:

The consumer can write a review about the product or file a complaint if they are not satisfied. The complaint is first forwarded to the store, and if the user does not receive a response in 10 working days, the complaint is forwarded to the consumer protection agency, which also notifies the manufacturer.

Another feature added after user testing is significant to the consumer’s voice. This feature supports other people’s cases so that the business or consumer rights can see that the case is needed and highlighted by many consumers. Another action can be taken when the case receives a response. Users can rate the response by either liking the response or not being satisfied with it.
5.3 Second testing
The prototype was tested again and led to helpful findings:

What the user liked:

Interacting with products was very easy and they liked the breakdown of information.

Complaining about products was very exciting for the users.

What they think should be improved:

Communication with stakeholders could be improved. This part was very inspiring and opened a discussion about what to do in the future or if I have more time to work on the prototype. Some ideas for future features to be added or edited to the application:

- A way to set up a chat channel between consumers and consumers.
- Is it enough to just put the cases with 50 supporters on the app highlights, or is there a better way to take the case to another stage?
- The application focuses on consumer-product interaction, but can it also be linked to store technology? You suggest connecting the application to the in-store screen first.
- How would the visualization look for an elderly man and how for a person with special needs?
- Can we add sound to the application?

Finally, some minor changes to the framework could be improved. Above all, I learned that this topic was exciting to consumers, and they were glad to see outreach about the topic worth highlighting.
6 EVALUATION/DISCUSSION

6.1 The final outcome

Lindström & Kasperi (2014) state that if people are granted more knowledge, they will make smarter decisions. Furthermore, to change the production industry, we have to take action to influence the shopping experience. The outcome results are helpful for carbon footprint and health safety considerations by scanning and synthesizing product information for the consumer and presenting the information through user-friendly visualization. However, a relevant future work would be not to limit the application to only these two directions, but to discover how to involve data about other aspects, such as animal welfare.

The research outcome considers the empowerment of consumers to make informed decisions, as this is the first question of the paper. To achieve this, the prototype aims to give consumers a fair chance to judge and decide for themselves what they should do, rather than dictating to them what they should do, or let only price be a deciding factor. The research resulted in a prototype that explains how we can convey and present information to consumers through an esthetic interaction. Furthermore, Wensveen (2000) described that this type of interaction leads to greater engagement with artifacts and interactive spaces. In this sense, we can see how the research result can be different from the design examples mentioned in the research. For example, the prototype does not just give a number for the carbon footprint. It also visualizes the information.

Visualization should be further explored and tested in future work. In the thesis I presented theories about interactive and graphic design, which were not fully applied to the design due to time constraints. But it was helpful in structuring the prototype that was used for testing.

The literature reviews provided reliable information about consumer behavior and were categorized into systems (Kahneman, 2011; Stanovich & West, 2003). These reviews helped in analyzing and fitting the results to consumer behavior. On the other hand when comparing the results with the literature, the research would open a discussion about adding the post-purchase consumer behavior considerations. The result states that post-purchase behavior should be considered to be studied and added to the shopping spree. By “post-purchase” it means how the consumer interacts with the product, how they feel about it, and how they can achieve more knowledge about it and how they can be supported. But the result is still limited to a small number of consumers, so hopefully future researchers would include more consumers’ experience of post-shopping when designing for consumer experience.

With the accessibility of the internet today, the consumer is primarily online, and as (Norman and Kirakowski 2018) mentioned, it is close to us as we have accessibility in our pockets. With that said, the research argues about placing the final results as a bridge between online and physical shopping.

The outcome also focuses more on values and shopping decision impacts, rather than deal hunting, which would have been a less rewarding experience, in that it’s more impactful to move the focus away from price, and towards values such as environment, health and animal welfare, but still make the decision be up to the consumer.
6.2 The design process

Due to this project's complexity, combining a structured design process such as the Double Diamond with a more flexible approach allowed me to learn from each activity and adapt upcoming activities according to the lessons learned (Krogh et al., 2015). However, this way of working allowed for further exploration of different possible directions during the process, which sometimes made it challenging to decide on a particular direction due to time constraints. In addition, time is a critical challenge in research. Some methods took longer than expected because they depended on users returning results. For example, suppose that I have cultural probes in the future. In this case, I will ask consumers to return the results at a certain time, or I will send them to many users and work with what I receive in time. On the other hand, the insights were very beneficial to the process.

The co-creating workshop with consumers was beneficial in approaching the final results. However, the workshop only included consumers and interaction designers, which left the question of what other stakeholders such as consumer rights or stores would suggest. Unfortunately, this was not the case for this project due to limited collaboration.

6.3 Collaboration with stakeholders

As the project was an everyday activity, it was not difficult to work with consumers, which benefited the process guided by user outcomes. On the other hand, due to COVID-19, consumer rights and shops did not collaborate with the project and only provided feedback through phone calls. The phone calls were limited to getting their opinion on the case in general. However, I wanted to share ideas and thoughts with them, which was not possible.

The prototype can be taken as a case study for future collaboration with stakeholders and explorers on improving the experience for the consumers.

7. CONCLUSION

The research process explored the relationship between consumers and products and how we can support their decisions. The results showed that interaction design could play a role in decision-making by opening the door to more information for consumers. Visualization played a significant role in informing consumers about product information to filter the data quickly. However, the result would vary depending on the user’s age, culture, or personal preferences. I see many opportunities for future work to improve the result of application visualization and enhance the user experience.

Another theme is empowerment through communication. Creating a hub where consumers can gather and express their needs and opinions about a product is very powerful. It would be very interesting to test how companies or stores will respond to this type of consumer feedback in the future.
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2.

**Age**
57 responses

- 20-30: 49.1%
- 31-40: 21.1%
- 41-50: 10.3%
- over 50: 10.5%

**Occupation**
57 responses

- Student: 54.4%
- Working: 45.6%

**Living status**
57 responses

- Living alone: 50.9%
- Living with partner: 40.4%
- Live with my kids and my partner: 8.8%
**How often you do grocery shopping?**

- 40.4% more than once a week
- 59.6% once a week

**How do you usually plan your shopping?**

- Make a list on paper: 17 (29.8%)
- Make a list on my phone: 26 (45.6%)
- Get inspired when I'm at the shop: 28 (49.1%)

**Does discounts play roll in your shopping list?**

- Yes: 47.4%
- No: 10.5%
- Sometimes: 42.1%
Do you think you have enough information about why there is discounts on some products at the grocery shops?
57 responses

- Yes: 36.8%
- No: 42.1%
- I wish they can tell me what is the real reason: 19.3%

Do you trust that the grocery shop providing you with all the information about the products?
55 responses

- Yes: 34.5%
- No, I want more: 34.6%
- They give me what they only want to share and that's not transparent: 30.9%

What transparency means to you (as a consumer) when it comes to products information and your relationship with the grocery shop?
54 responses

- Price should not be the main issue: 6 (11.1%)
- Share origin of product that's fair trade or organic: 35 (64.8%)
- Share transport carbon footprint: 23 (42.6%)
- Share what animals welfare of products: 31 (57.4%)
- Share how much pesticides used: 28 (51.0%)
- Show the amount of sugar per serving: 21 (38.9%)
- Share that if the product is EC: 23 (42.6%)
- Information about health or side effects: 26 (48.1%)
- Where some products will end if: 26 (48.1%)
- Other info not included: 7 (13%)
Does it come to your mind that cheaper products might be less quality or not healthy?
57 responses

- Yes: 56.1%
- No: 12.3%
- Yeah and I wish to know why it is cheaper than the product next to it sometimes: 31.6%

Do you consider Fair-trade tag when you buy products?
57 responses

- Yes: 49.1%
- No: 17.5%
- I do not know what fair trade is: 14%
- I know what fair trade is but I do not trust it: 19.3%

Do you think the information about meat is enough on the packaging?
56 responses

- Yes: 26.8%
- No: 26.8%
- I wish that can share more information about sustainability (how much it cost my planet): 44.6%
Do you think the information about the products is enough for you to make an informed decision to buy products?
57 responses

- Yes: 40.4%
- No: 28.1%
- Not sure. I wish to have access to information I desire about the products: 31.6%

Have you had to google products information at the store to make sure it’s healthy or sustainable?
56 responses

- Yes: 57.1%
- No: 42.9%

Do you wish to be able to have quick answers about products at the grocery shop?
57 responses

- Yes: 86%
- No: 14%
Do you believe the price tags is the real cost of your grocery products?
54 responses

- Yes: 61.1%
- No, and I wish to have a tag of what this cost my planet as equal to what this cost in money: 38.9%

If there is a way to access more information about products, which media would you prefer to use?
55 responses

- APP on my phone and scan at...: 39 (70.9%)
- The same tool I use to scan products: 22 (40%)
- VR to have a look how the product is made: 3 (5.5%)
- AR with my phone: 10 (18.2%)
- Screen at the shop on top of the product: 12 (21.9%)
- More categorized food tags with links: 22 (40%)
- Somewhere at the shop where I can scan: 19 (34.5%)