Designing for sustainable grocery shopping

A conceptual design to encourage sustainable shopping

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Att designa för hållbar shopping: En konceptuell design för att uppmuntra till hållbar livsmedelshandel

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Abstract

Klimatförändring är en av de absolut största problemen som världen står inför idag, och en av de största faktorerna till klimatförändringar idag är matvaror. Denna uppsats har som mål att undersöka om man kan, med hjälp av digitala artefakter, skapa en produkt eller koncept som ska uppmuntra användaren till att handla mer klimatsmart. För att åstadkomma detta har jag försökt att identifiera de största hindren idag som enskilda kunder upplever genom den användarcentrerade metoden Contextual Inquiry. Resultaten har jag sedan presenterat för KTH-studenter via workshops. Under dessa workshops har studenterna tagit fram koncept och ideér för möjliga lösningar. Baserat på detta har jag därefter tagit fram en konceptuell design på en digital produkt som jag kallar “SmartCart”. SmartCarten består av en vanlig kundvagn med en iPad-liknande skärm fäst vid handtaget som förmedlar olika varors klimatpåverkan i realtid. Designen är inte prövd i butik, men tidiga tester tyder på att sådana försök skulle kunna ge önskat resultat gällande försäljning av produkter med hög klimatpåverkan, samtidigt som det kan ge kunderna en bättre upplevelse i matbutiken.

Climate change is one of the biggest issues that the world faces today, and one of the biggest contributors to climate change are groceries. This paper aims at using digital artefacts to create a product or design that will encourage the user to shop more environmentally friendly. To achieve this, I have tried to identify the major hindrances today that grocery shoppers are faced with through the user centered method Contextual Inquiry. I have then presented the results from the inquiry to students at KTH Royal Institute of Technology during workshops. During these workshops, the students have conceptualized ideas and designs for different solutions. Based on their results, I have created a prototype design that I call the SmartCart. This cart consists of a regular shopping cart with a screen similar to an iPad attached to the handlebars. This screen then delivers easily apprehensible information about different grocery products environmental impact in real time. The design has not been tested in a live environment, but initial testing indicates that a live application could give satisfying results in lowering the sales of grocery products with a high environmental impact, while the design also could simultaneously improve the shopping experience for the customers in the grocery store.
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1. Introduction

Food consumption has increased, and will continue to increase, along with the worldwide ever growing population. The production of food has led to numerous negative influences on the Earth, such as the degradation of ecosystems, loss in biodiversity, and most importantly, climate change \(\textit{\text{Foley\ et\ al.\ 2011}}\). The bulk of the negative impact from food production lies in commodity production and trade part \(\textit{\text{Angervall\ et\ al.\ 2008}}\). This naturally means that if we are to change the food production and consumption norms of today, we ought to start with the production and handling of food. As large industries are hard to change from within the industry itself, the best way to affect them is through their consumers, nothing makes an industry change as fast as transformed consumer behavior and demand. Change the behavior and consumption patterns of the customers, and the industry will inevitably have to follow to meet demand.

The awareness of ethical and sustainable grocery shopping amongst the general population seems high, yet the actual involvement in sustainable shopping activities is low \(\text{Bohne, Zapico, \& Katzeff, 2015}\). These kinds of behaviors can however be stimulated through increased tangible and easily understood facts, as shown by D. Lindström and J. Kasperi in their project where they created a browser plug-in called “Foodprint”. As they wrote in their report:

“The increased awareness affected the subjects so that they reflected more about the groceries they were buying”.

According to their results, it was clear that if customers get a clear and tangible overview about the effects their groceries has, the customers will subsequently search for more climate-friendly options. In other words: “…\textit{people do smarter climate-choices if they’re presented with information about what kind of impact their different options have}” \(\text{Lindström \& Kasperi, 2014}\).

The objective of this project is to take it one step further, and explore how to impact the customers’ choice while they are grocery shopping, by creating opportunities for the customer to get more involved in the ways of sustainable thinking. By doing this, I hope to achieve a way of creating new shopping behaviors that are compliant with sustainable shopping, so that the average grocery shopper will engage in environmentally friendly and sustainable grocery shopping.
1.1 Research Question

How can grocery stores today use digital interaction design to help their customers practice more environmentally friendly, and sustainable grocery shopping?

In order to find one plausible answer to this question, the following sub-questions will be examined:

1. What are customers’ general levels of knowledge around the subject?
2. What is the attitude towards sustainable grocery shopping?
3. What is the main issue today that is potentially stopping people from engaging more in sustainable grocery shopping?

1.2 Hypothesis

My hypothesis for this degree project is: if the information about the environmental impact of each product is presented in a simple enough way, and at the right time, the customers will adopt a more environmentally friendly shopping practice. This will happen even though the price will remain unchanged for the environmentally friendlier products.

2. Theory

2.2 Theoretical models

2.2.1 Contextual inquiry

Contextual inquiry is a way of conducting qualitative research on user behavior by interviewing users “within context”, i.e. when they are in working environments of their interest. The interviewer simultaneously observes the user and can therefore catch behavior and results that the user him/herself might not be aware of, and can also interrupt at any time to ask in-depth questions about specific behaviors, actions, or thoughts. The results are qualitative, as opposed to quantitative (“Contextual interview,” 2013).
2.2.2 FBM model

BJ Fogg has created a model for understanding human behavior. The model is called the Fogg behavior Model (FBM) model (Fogg 2009). According to this model, in order to create persuasive design and alter the behavior of users, one must understand the three factors of behavior that are described in this model. Those three factors are:

Motivation

Motivation is needed to change behavior. The motivation to do something is extremely personal, and the grade varies per individual.

Time

The user needs to have time to do whatever task the design is supposed to persuade them to do. If a task requires a lot of time, it is not a simple task and thus not a simple design.

Ability

The ability for the user to actually perform what they want to do is a major factor. This does not mean to train or teach new things to the end user, but rather make it as simple as possible for the end user to actually do that for which the design is created. Therefore, to create persuasive behavior, we must make things easier for the end user. As Fogg puts it:

“We are fundamentally lazy...designers of persuasive design must make the behavior easier to do. In other words, persuasive design relies heavily on the power of simplicity.”
Simplicity in itself is broken down into six different elements in this model:

**Money**

Just like time, if users need money in order to perform the task at hand, it is not an easy task, and therefore, not simple design. When it comes to time and money, one must cater to the specific user target groups. Time and money are relative to each individual.

**Physical effort**

Just as time and money, any design that requires a lot of physical effort is most likely not simple design.

**Brain cycles**

The other side of the coin of physical effort, if something requires a lot of brainpower and a lot of thinking is involved for the design to work; it is probably not simple design. People do not want to overthink; the design should be easily understood.

**Social deviance**

If a behavior is going against the social norms and practices, the act itself cannot be simple. This will lower the persuasiveness of the design, as it comes with a social price, and perhaps that is not something all users are willing to pay.

**Non-routine**

If the target behavior is not part of a routine or habit, there is an elevated risk that the design is considered non-simple for the end user. When seeking simplicity, people tend to search for routines.

**Triggers**

The concept of “triggers” is not new, and exists under different names (cues, prompts etc.). A trigger is what tells the user when to perform the desired behavior. Every trigger is supposed to show the user that “now is the time to perform this behavior or task”, i.e. the trigger has to be presented at the right time.
2.2.3 The Fogg 8 step design process

BJ Fogg has also designed an eight step design process for creating persuasive designs that will not run a high risk of failing. A huge problem in the persuasive design community is the high risk of products failing their goals for various reasons. This design process has been tested in the industry and has been proven a good ground for designing persuasive products. The steps taken into consideration during this design process are:

1. **Choose a simple behavior target**

According to Fogg, “the design team should select the smallest, simplest behavior that matters”. Aiming too high or too broad will become too much to deal with, and end up in failure. Creating smaller goals will make creating the design easier, and additionally make the results more tangible and measurable. This is one of the most important parts of the design process.

2. **Choose a receptive audience**

When deciding on a target group, the group should be pre-disposed to be receptive towards your design. Targeting people who do not want your product, even if they need it, will surely end in failure. The goal of the design process is to create a product that convinces some people, but not all people.

3. **Identify what is preventing the target behavior**

It is important to find out what stops the target group from reaching a desired behavior. The design depends on whether it is a lack of ability, motivation, or triggers. The answer is most probably a mix. It is important to find out what is preventing the target behavior, where the method for finding out what is preventing the customer is dependent on the context.

4. **Choose an appropriate technology channel**

The design has to be based on the right kind of channel. Which one is the right one is based upon the factors already mentioned in step 1-3; the target behavior, the target audience and identifying what is preventing them. Based on this, the technology channel (webpage, Facebook page, mobile app, paper magazine etc) must be the easiest one in which to communicate. A common trap here is to want to go for the newest technology, even if the need is not there. Sometimes simpler technology will work better.
5. Test & iterate quickly

A couple of different prototypes should be made, and they should be tested on an audience for assessment of the efficiency of each prototype design by observing the audience’s reaction to the different prototypes.

2.3 Definitions

2.3.1 Sustainability

The term sustainability is a wide concept. The term is generally considered to break into three categories; social, economic, and environmental (Kuhlman, T & Farrington, J. 2010) and these categories have in common that it is about “maintaining well-being over a long, perhaps even an indefinite period”. We will only be looking for the environmental category, meaning that we only focus on the well-being of the environment.

2.3.2 GHG

The term GHG, short for Greenhouse Gases, are gases that trap heat within the earth’s atmosphere (EPA, 2016). There are four major GHGs, namely: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), and Fluorinated gases.

2.3.3 CO2e

CO2e, or “carbon dioxide equivalent”, is a measuring unit that has been standardized in order to be able to measure the impact that the rest of the GHG has. The unit expresses any GHG emission in terms of how much CO2 is needed to achieve the same impact on the climate (The Guardian, 2012) and uses standard ratios to convert from any GHG to its CO2. By using the CO2e, we are able to measure and compare different products’ total impact on the environment in an easy way.
2.3.4 Sustainable grocery shopping

Sustainable grocery shopping will here be defined as engaging in purposefully and consciously buying products and groceries that are less environmentally damaging. This implies that the products have low CO2e values (see definition) or have some influence on being less harmful for the environment than other similar products, for example locally produced meat as compared to imported.

2.3.5 Environmentally friendly vs ecological

Environmentally friendly must be separated from ecological food, or “organic food”. Environmentally friendly means that the product or grocery is an entity that will have a relatively low impact on the environment with regards to all types of GHGs where the environment is seen as the whole world as one single organism throughout its entire lifecycle. The word ecological however, refers only to products with low or no impact of pesticides, industrial solvents, or other materials that can be damaging to the immediate surroundings (Gustafson, 2011). Ecological products do not take into consideration, for example, the release of methane gas produced by cows, or the travelling expenses in terms of CO2 emissions for different products, meaning that products that travel around the world will still be seen as ecological, but they are not environmentally friendly.

2.4 Delimitations

This thesis will only focus on environmental sustainability, economical and/or social impacts will not be taken into account, at all.

Given the timeframe, user feedback and iterations on any eventual prototype design will be limited. The focus will be exploring what is needed to encourage and support customers in sustainable shopping and getting design concepts. Any design created will not be tested in a live environment but will be based upon the focus groups and workshops that will be held.

In addition, the focus of the people that will be studied will be on those who already have a positive attitude towards sustainability in general, so as to make it easier to find patterns in their behavior and understanding what is keeping them from engaging more in sustainable shopping, other than their sheer indifference towards the subject.
3. Method

3.1 Contextual inquiry

To find out what makes a customer consider, or not consider, sustainable shopping, I chose to follow a group of eight people around the store and observe their shopping behavior. For this contextual interview, I created a questionnaire. The contextual inquiry consisted of three steps:

1. I asked a couple of general questions. At this stage, I asked anyone who was about to enter the store if they had a couple of minutes to answer a few questions regarding grocery shopping. This was done to be able to filter out those who had no interest in sustainable shopping, as I focused on those who already were positive towards sustainable shopping. Those who were of interest for me, I asked if I could follow them along in the store and ask them some further in-depth questions.

2. I observed the customers as they went about their shopping, writing down everything interesting in their shopping behavior. From time to time I also asked about specific choices they made or did not make.

3. When the shopping was done, I went in-depth and asked questions concerning sustainable shopping. Before the shopping, I tried to make sure that the customers were not aware that the contextual inquiry focused on their sustainable shopping behavior - only on their general shopping habits - so as to not manipulate or influence their shopping behavior. After the shopping was done, I revealed what the interview was really about and asked more questions around the topic and let them answer freely.

For the entire questionnaire, see appendix.
3.2 Creating a CO2e database

Before the first steps for the design was taken, data for a lot of different groceries had to be gathered and compiled into a simple database over groceries and their respective CO2e. This data was what the design was supposed to present and visualize for the customer. The data was mainly gathered from three different sources:

1. Mat och klimat – En sammanfattning om matens klimatpåverkan i ett livscykelperspektiv – Angervall et al


3. Mat-klimat-listan version 1.1 - Elin Röös

These sources contains various grocery items and their respective CO2e numbers, some items appear in all three sources, in which case the average was calculated and used. The information for the items was compiled into an Excel-sheet, containing ca 50 different items. The CO2e numbers in this list was the essential part which the design had to communicate to the user.

3.3 Expert workshop

In these two workshops, a total of 10 students were gathered from the Media Technology program at the Royal Institute of Technology (KTH) in Stockholm, Sweden, at one hour each. Both of the workshops were held at KTH the same day in June 2016. The students were gathered voluntarily through one of their current classes at KTH by contacting the course administrator. Each workshop consisted of five students and they were both independent of each other and none of their work was shown or even mentioned to the other group. In these workshops, the students were presented with the results from the contextual inquires and were asked to brainstorm ideas and to develop different kinds of digital interactive design concepts that could aid the customers in their shopping with regards to sustainable shopping.
The workshop was divided into three phases:

1. Phase one started with me explaining what the thesis was all about, how I defined environmentally friendly, explaining CO2e, and presenting the results of the contextual interviews. When the students had all the necessary background information, which took around 15 minutes, they were given five minutes to read through the results and to think about what the solutions might be, as well as asking any questions they eventually might have had.

2. I then gave the students ca 20 minutes of brainstorming time where they could present every idea they had, no matter how abstract or vague they were. These ideas were all written on a whiteboard to create a big mind map. In this phase, the technical aspect were not to be considered, the students were free to be as creative as possible without thinking about how the design should be done.

3. Lastly, they were given around 20 more minutes to, as a group, go into an in-depth design thinking and creating the concepts with a technical and more concrete aspect. During this phase the students drew on papers, iPads, iPhones, and whiteboards to illustrate their own ideas. They were supposed to use all of their engineering skills to solve the design and engineering problems that potentially surrounded their ideas from phase 2 in order to create a viable and reasonable concept.

When the workshop was over, a record was kept of the progress by storing all of the papers, saving images of all of the digital work, and by taking pictures of the whiteboards. The work was then digitally re-created to replicate the mind maps. The digital results can be found under “workshop results”.

Based on the results from the workshops with the students, an attempt to conceptualize a prototype design was made. Even though there were many great ideas, one of the ideas stood out from the rest and was repeated at both workshops. Given the time limit, a decision was made to focus on creating only one concept prototype based upon this idea.
3.4 App design

The idea that repeated itself was the idea of a “smart grocery cart”. This idea was also the one that both groups chose to focus on and most of the brainstorming spun around this particular idea. The concept is to put an LCD-screen on the handles of the cart; a prototype of this would be to simply put an iPad facing the customer.

For the design, I followed the 8-step model. Step 1, the behavior has been targeted. Step 2, the audience has also been targeted. Step 3, finding the target behavior has been identified: lack of easily accessible information. Step 4, finding the appropriate channel: the use of an iPad app. Step 5, fast iteration. When the app design was made, I had three people use a simulation of the app. After explaining the scenario that they would see this app on the handles of their cart when going shopping (this was all the information they had received), each person gave their feedback. Between each person I made another iteration based on that feedback.

4. Results

4.1 Shopping behavior

After analyzing the results, the following observations were made:

- 7 out of 8 only gave a quick glance at the products and prices, only one actually looked at the nutritional value, country of origin, and other information before choosing.
- No participant spent more than 10 seconds looking at a product and evaluating it before deciding to buy it.
- Most participants thought that ecological and sustainable were the same thing, even those who knew the difference still considered them the same and assumed that if a product was ecological, it was automatically also a good sustainable choice.
- Ecological options were considered to be tastier; five out of eight people explicitly said so when it came to ecological choice.
- Ecological products were also considered healthier for the human body. This was the main reason for buying ecological products.
Some participants expressed distrust to the “ecological stamp” in general – even though they trusted products with KRAV-certification. They believed that stores would tweak small parts of their products so that they could brand it as “ecological” and subsequently raise prices.

Environmental sustainability is generally not considered at all – not even by those who think ecological choices are important. It was seen as a minor problem.

Most participants found that the lack of information about the products’ ecological and environmental impact was a major hindrance to shopping for more sustainable groceries.

Not one participant was willing to put time and effort into searching for the information that they allegedly wanted and needed to make better informed decisions regarding sustainable products.

Most participants expressed a feeling that the stores had to improve their ecological thinking in order for them to buy more, i.e. more deals on ecological products, more information, a whole department only for ecological items, lower prices, etc.

No participants used analog devices to plan their shopping – they either just remember what they wanted to buy or they used their smartphones to manage a shopping list.

After asking the participants, it becomes clear that most participants would rather not spend more money on ecological products, although they are willing to pay around 15% more than a comparable non-ecological product for it.

Only one participant used his smartphone during shopping, he had an app with all the deals and promotions that all the stores were currently having.

Two participants felt that being truly environmentally friendly is impossible due to the lack of “true” environmentally friendly products – as being “truly” environmentally friendly would mean that they had to be locally produced, as well as using no pesticides or other substances, such as preservatives, that in any way are harmful to the environment. To quote one of the customers: “What actually is environmentally friendly is a very long list. I cannot think of everything right now but it is a long list and we cannot even check the majority of them”.

4.2 CO2e list

Below is listed the most important numbers that were of interest, as these are some of the most common groceries and also have high difference in CO2e numbers. This list also shows the difference between locally produced and imported products where information is available.

<table>
<thead>
<tr>
<th>Grocery</th>
<th>CO2e (kg)</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>beef</td>
<td>26</td>
<td>Per kg boneless beef</td>
</tr>
<tr>
<td>Swedish beef</td>
<td>17</td>
<td>Per kg boneless beef</td>
</tr>
<tr>
<td>chicken</td>
<td>3</td>
<td>Per kg boneless chicken</td>
</tr>
<tr>
<td>Swedish chicken</td>
<td>1.7</td>
<td>Per kg boneless chicken</td>
</tr>
<tr>
<td>pork</td>
<td>6</td>
<td>Per kg boneless pork</td>
</tr>
<tr>
<td>Swedish pork</td>
<td>4.5</td>
<td>Per kg boneless pork</td>
</tr>
<tr>
<td>Milk/yoghurt</td>
<td>1</td>
<td>Per liter</td>
</tr>
<tr>
<td>Cheese</td>
<td>9</td>
<td>Per kg</td>
</tr>
<tr>
<td>Butter</td>
<td>8</td>
<td>Per kg</td>
</tr>
<tr>
<td>Rice</td>
<td>2</td>
<td>Per kg dry rice</td>
</tr>
<tr>
<td>Pasta</td>
<td>0.8</td>
<td>Per kg dry pasta</td>
</tr>
<tr>
<td>Coffee</td>
<td>3</td>
<td>Per kg dry merchandise</td>
</tr>
<tr>
<td>Quorn</td>
<td>4</td>
<td>Per kg Quorn</td>
</tr>
</tbody>
</table>
4.3 The Climate Controller ratings

Presenting the CO2e ratings of the grocery products was essential - the hypothesis is that through easily understood presentations of information, the customers will be encouraged to change their shopping behaviors so that they shop for more environmentally friendly groceries. Therefore, the customer needs to have a very simple and fast way of getting a rough understanding of what products are ecofriendly and what products are not.

For this purpose alone, I designed the CO2e rating that I call the Climate Control ratings, or the “CC ratings”. The rating is supposed to give quick and easily understood information to the customer about the impact of the groceries they are looking at, and therefore giving the actual CO2e numbers will not provide any tangible understanding, therefore the rating is a simple number that is shown next to, or under, the item on the screen. This corresponds to step 1 of Fogg’s design process. Step 2 is to find a receptive audience, which matches perfectly with a shopping customer being in the store. The purpose of the rating is to be the solution to step 3, which is prohibiting the behavior (as we already have stated, the lack of tangible information is the prohibitor). For this to be simply understood, I had to choose whether to use the numbers 1 to 10, 1 to 5, or “low-medium-high” rankings, or just a “green-yellow-red” tag. Moreover, I had to illustrate in a simple way that the numbers/rankings represent the impact on climate and/or nature.

In the creation of these CC ratings, I created three different design concepts and followed Fogg’s FBM model to get the most simple and understandable design. To understand which one of these was better, a prototype of each of these visualizations was created. It was later given to a group of test subjects that consisted of people that I had handpicked within my own social circle, especially chosen on account of their non-technical background and given that they had extremely little to no knowledge at all about my thesis project. They were given only one question: “As a ranking system, ranking any kind of quantity, which one of these is intuitively the best and most simple one?” The design with the numbers 1-5 came out on top, and therefore it was used as the design.

The design was then re-iterated by user testing on a small group, picked the same way as before, where they had to answer two questions: “Did you understand what the number represents?” and “was it easy to understand? If not, why?”
4.4 Design concept - Presenting CO2e in an easy way

The system that I chose to use was the white version of the 1-5 ranking system (Figure 2), where only the number will be shown in its designated colored circle. Below are all the different full ranking systems that were made and user-tested.

These are the two versions of the 1-5 ranking system.

![Figure 1 - Black 1-5 ranking system](image1)

![Figure 2 - White 1-5 ranking system](image2)

Below you will see the High-Medium-Low version of the sticker.
Lastly, you will find the pie charts version below.

The reason why the 1-5 rating won was that it was the only one that was straightforward for all of the participants. The High - Medium - Low was not specific enough - some of the participants felt that it was not incremental enough. The black and white pie charts felt confusing to some - There was confusion on whether more black meant that it was worse or better for the environment.

4.5 CO2e - Creating the ranks

The scale from 1-5 was created so that the product with the least CO2e number was used as a reference for rank 1 and the one with the highest number was used for rank 5. The product with the highest CO2e number was cage trapped Norwegian lobster with the CO2e number of 32 (kg CO2e per kg lobster trapped). The lowest CO2e product was potatoes at 0,1.
The scale then was cut into five parts resulting in this chart:

<table>
<thead>
<tr>
<th>CO2e</th>
<th>Number on scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5.9</td>
<td>1</td>
</tr>
<tr>
<td>6-11.9</td>
<td>2</td>
</tr>
<tr>
<td>12-17.9</td>
<td>3</td>
</tr>
<tr>
<td>18-24.9</td>
<td>4</td>
</tr>
<tr>
<td>25-32</td>
<td>5</td>
</tr>
</tbody>
</table>

4.6 Workshop results

Below are the mind maps that show the results of the workshops held with the media technology students from KTH Institute of Technology. These mind maps were recreated digitally as copies of the mind maps written on the whiteboards as results of the workshops that were held. Most of the ideas were not given any deeper thoughts but got stuck at phase 2 (brainstorming without limitations), and thus stayed on only on an abstract level, while some ideas were appreciated by the entire group and therefore got more focus and became more developed in phase 3 (designing concrete solutions).
Mind map 1:

- Digitalization of grocery stores for sustainable shopping
  - The first and basic point on which the entire brainstorming workshop was based.
- Smart shelves
  - Digital shelves in the store instead of analog ones.
- QR codes
  - Each product would be tagged with a QR code that customers could scan.
- Incorporate smart watches
  - Somehow smart watches could be incorporated to make sustainable grocery shopping easier for customers.
- Smart glass on freezer counters
  - On all deli counters there should be smart glass, i.e. LCD screens with touch sensors, that provides info about the products, such as price, country of origin, CO2e number, alternatives and where the alternatives can be found.
- Smart Shopping Cart
  - A smart shopping cart with an interactive screen on the handles and sensors in the cart. The sensors should be able to measure weight and the interactive screen should have a scanning function to scan groceries. The screen will be able to give the same information as the screen on the deli counters, as well as a map over the store and search-function for specific groceries. The cart could also be rigged with red and green lights and speakers to make alert sounds, to give feedback on the groceries that are put into the cart.
Mind map 2:

- How to encourage sustainable shopping.
  - The base question on which the second workshop brainstorming session was based.
- Aimed smell & sound
  - By using aimed smell and sound, the customers shopping patterns could be manipulated.
- AR & VR
  - By using Augmented- and/or Virtual Reality, the customers could get more information live. The customers could also experience from where the products originate and how they were made. The consequences of GHG emissions could also be shown directly to the customer via simulations, either through holograms, glasses, or simple screens.
- Facebook games & Gamification
  - By using existing platforms of gaming, such as Facebook, or by trying to create a “gamification” of the shopping experience, the customers could be turned towards more environmentally friendly shopping practice.
  - The customers could “compete” against each other in having as low CO2e impact as possible. Customers could also see how they fare against the “standard”.
- Getting a summary at cashier check out
  - By getting a summary when checking out, the customers could see their own CO2e emissions and their contribution to the global warming issue.
- Have info on floor
  - By putting information on the floor that will guide customer to different aisles with the help of color coding and putting CO2e information on the floor, the shopping experience can be easily enhanced.
- Smart Grocery Cart
  - A cart equipped with an LCD screen that has a scanning function that gives all the information of the products (price, country of origin, nutritional values, CO2e value, etc.) as well as a map over the store. The app that runs in the LCD screen can be connected to a smartphone as well via customer login that will enable the phone to scan instead.
4.7 Design concept - SmartCart

The design is focused mainly on the “app” that will be running on the “iPad” that is theoretically attached to the shopping cart. This “app” will bring everything in the shopping experience together into one simple entity - easily scan your groceries and the SmartCart will keep track of how much the total sum is, tell you the nutritional values of the product (such as carbohydrate-, protein- and fat levels), the CO2e emission, any alternatives that may be in store and what kind of recipes are recommended. The SmartCart will show you where in the store you can find specific products, and also highlight ecological areas or items. Lastly, by keeping track of the customers inventory, checking out and paying at the store would become easier and faster. Everything a customer would need is built into the SmartCart, and through this simplification of shopping, the SmartCart will be able to encourage customers to engage in sustainable shopping.

Figure 1 - Login screen

Figure 1 shows the login screen, where the customer logs in, either using a username and password, or by scanning a tag on their phone via the front facing camera on the iPad. This is an optional step for the store, and it depends on whether or not they want the system to be used exclusively by their members or if it should be available for everyone.
Figure 2 shows the home screen, where the left panel is the user’s panel from which the user reaches settings, shopping lists, and a floorplan of the store. The store’s current deals will be shown on the first row and the second will display the recently bought items by the customer.

The CO2e rating is displayed below each product. The customer scans the product with the camera before adding it to the cart. This allows the product to automatically register into the cart.
Figure 3 - Shopping cart
Figure 3 shows the cart, where a list of all the groceries in the cart is shown, along with price, nutritional values, and CO2e ratings.

Figure 4 - Grocery search
Figure 4 shows the grocery search function, where the customers can search for the products and get information like price, CO2e ratings, and where in the store the item can be found.

Figure 5 - Climate Controller ratings
Figure 5 shows the “Climate Controller rating” button where the customer can get a full explanation and understanding of how the ratings work.
Lastly, figure 6 shows more information about CO2e. This information can be found easily without it being forced upon the customer.

## 5. Analysis and Discussion

The number one reason why the customers did not engage in sustainable shopping was because they felt that they lacked sufficient information in order to make an adequate decision (which might be another way of saying that they were too lazy to look up any information themselves). This in turn made the customers almost completely ignore the little information that actually existed. This in coherence with the fact that customers never seemed to have the patience or will to look for information (they spent a maximum of 10 seconds on each grocery), makes us realize that the information has to be accessible and understandable within these 10 seconds of approaching and analyzing a product. Also, the information has to be served to them in order to raise their awareness (and consequently affecting their choices as previously argued for by Lindström and Kasperi).

The design, therefore, has to address this issue. The problem is that we know from previous attempts that information alone is not enough. People need the easily presented information and the solutions also given to them, as thinking goes against "habit" and "routine" which is the key to simplicity. Any relatively difficult learning curve is too much of a learning curve and demotivates use and thus won't be learned, no matter how simply it initially is. If it requires thought and effort, it's too much for many people.

The design therefore must not only inform users, but also enable them to easily and quickly identify and purchase products in the stores that are less environmentally unsustainable, something that I attempted to do. The design is created to meet the criteria of Fogg’s 8 step model and also created with his FBM model in mind. The model says that the three things needed are motivation, ability, and a trigger. We have already seen that the will is there, but the motivation might not be. By creating this SmartCart, we will make sure that the ability will also be there through the simplification of information. The trigger will be easy to create, as the customer is already at the store and about to do his or her grocery shopping. By labelling each product with their respective CO2e number, the customer will hopefully be triggered to look for the products with lower numbers.
There are other issues that have to be addressed. When asked about the biggest problems in stores today, one customer put it like this:

“I know that some products have the “good environmental choice” label, but I don’t know what that is. Maybe the store needs to make better signs and generally better information about what’s actually environmentally friendly. And in that case, also mention which aspect, the packaging or the transportation or such”.

The notion of bad information once again appears here, and it seems like this is a common opinion amongst those whom I asked. This once again indicates that the problem that is preventing target behavior is a feeling of lack of knowledge, and distrust to the information given.

Another customer says this:
“Except a lower price, we need better certifications and more regulations. We need information as well, like exactly where the product comes from and stuff like that. The certifications, like KRAV, need to get out there and tell people where the products are from and what their regulations are for having that certificate, then you trust it more and you also become more willing to pay more for it”.

It is once again about the information about the products becoming clearer. The customers seem to have a hard time understanding the “what, why and from where” questions about the certifications and products.

A third customer says the following:
“There’s no structure. Some stores have it really messy, for example gluten free is mixed with other stuff. So, if I want gluten free flour I need to find the gluten free alternative among dozens of other options which becomes a hassle. It is the same with ecological products. I just want it all at one and the same place. This particular store has a department for ecological products but that’s a rare occurrence, no other store I know of has it like that”.
It becomes apparent that the common knowledge about environmentally friendly products is nonexistent. In other words, the information about these specific brands and badges that are supposed to endorse environmentally friendly products, are not reaching the customers. This was partly explained by the fact that none of the eight subjects actually cared about environmental sustainability enough to engage in it, even though it was “kind of” important to them. When asked why, and what he needs in order to start shopping for sustainable groceries, one of the customers answered:

“Then the whole damn food industry has to switch to locally produced. There’s no reason otherwise to even care. If I buy 1 kg of tomatoes for 12 SEK from Holland, I can’t be standing there thinking “is it environmentally friendly?” The transportations are what are causing the problems, and it is only 12 kronors. I just can't think about the environment right now, because the products that are available for purchase, are not environmentally friendly. Not a single one of them”.

“And you would buy that then, if it is locally produced?”

“Yes. That would be more expensive for me, but then at least I’d know that it is environmentally friendly for real, 100% environmentally friendly”

This kind of mentality of giving up hope and just not caring is something that needs to be addressed, as it seemed to repeat itself indirectly with every customer, even though only one said it explicitly. Even if we cannot switch the entire food industry to only locally produced food, if we are able to show in an easy and fast way that the products do indeed exist, people like this customer might also start buying environmentally friendly groceries. We also need to address the “what, why and from where” questions that are being asked about both the products and the certifications.
Another factor that immediately stands out is the economical factor. The products have to be cheaper than what they are today - even though most customers seemed willing to pay more for eco-friendly products. Since this is in no way something that this project can change, I will instead argue that by making the information about the products more accessible and understandable for the customers when they are in the stores and about to make a decision, some of them will still choose to pay for the more expensive products, especially since many in the study did say that they could pay a higher price, up to 15% more, as long as they are certain that the products are indeed environmentally friendly.

Lastly, no customer knew that there even was a difference between ecological and environmentally friendly. I hope to be able to work around this problem by introducing the CO2e rating on products - no product can be environmentally friendly without having a low number, therefore any ecological product that is not environmentally friendly will be revealed as such by the CO2e rating.

As Lindström and Kasperi already stated, when customers are provided with adequate information, they are more likely to use said information. Therefore, providing the information in an easy and quick way, by for example using a Smart Cart, we will eventually encourage people to make choices which they would not have otherwise made. Furthermore, this design, as a byproduct, would actually help the customer to keep track of how much their total sum is, what they have in their cart, etc. This means that it would give a whole new dimension of assistance to the customers, creating a new kind of shopping experience. This was not intended, but is a welcome addition to the design. This also shows that something as theoretically easy as creating a rating system very fast becomes more complex as more and more different aspects come into play.
The SmartCart design is an attempt to answer the research question. The answers to the sub questions are:

1. The general level of knowledge around the subject is low.
2. The attitude towards sustainable grocery shopping is complicated, as customers say the care about it, but do not do much about it. There is however, a small will to shop more sustainable.
3. The main issue that is stopping people from engaging more in sustainable shopping is the lack of easily accessible information.

Unfortunately, I did not get a chance to test the design in a live environment, and therefore was not able to prove or disprove my hypothesis. However, everything so far does insinuate that the hypothesis is indeed correct. The customers seem positive to engage in ecofriendly grocery shopping, as long as the information is provided to them and they do not have to put in any extra effort into choosing the products, as proposed by Fogg in his model, where physical effort and brain cycles are part of the abilities that creates simplicity.
6. Method Critique

6.1 The final design of the prototype

As it is right now, the final design still looks like a rough sketch. My hope and ambition was to have a fully functional prototype working as I envisioned it. Instead, I had to settle for an interactive mock-up with flaws on the visual aspect. I underestimated how much time it would actually take to build the interactive prototype. More time than expected went to “back end” making the prototype actually work, resulting in me unexpectedly not being able to put sufficient time into the actual design. I should have focused less on making it interactive and working, and put more into the thing that I originally cared for, the visual design.

6.2 The 1-5 scales

The balance of the CO2e 1-5 scale should not have been proportionally incremented, but rather weighted towards the average CO2e numbers of the groceries with regards to the average CO2e number, since it was not necessarily the same number as the interval for the number three on the scale. This would have given the products a more accurate presentation on how damaging they are to the environment compared to other products.

6.3 The hypothesis

Some might argue that I should not include the hypothesis in the paper, since I did not reach a point where I could actually prove or disprove it. However, I feel that the hypothesis plays an important role in my approach to the problem at hand and therefore is important to disclose so that the reader can get a certain understanding of my thoughts and expectations along the process.
7. Taking it further

The next step after this thesis would be to incorporate this design into an actual store to try it out in a live setting. It is uncertain whether or not there is any store willing to do this, as it would require some costs for the programming of the app, the installation of the iPads or similar technology, onto the shopping carts, the maintenance of the database, the costs of wear and tear etc. However, I do strongly believe that if this is tried out in a grocery store, it would prove to be a success, minor or major. Not only from an environmental perspective, but also from the store’s perspective, as customers do enjoy simplifications in their daily habits. The only question is which store, if any, would want to take on the costs and be the first one to try out this new kind of digital system within the realm of grocery shopping.
8. Appendix

8.1 Questionnaire

---Fas 1----------

1) Vilka är de två viktigaste sakerna när du handlar:
   a) Lågt Pris      b) hög kvalitet   c) Ekologisk bra val (KRAV/ miljömärkt etc)
   d) Välkänt märke  e) Etisk bra val (Fair Trade/MSC etc)

2) Bor du:
   a) själv          b) Med annan vuxen   c) Med barn

Om c:
   Hur många barn i hushållet?
   a) 2    b) 3  c) 4 d) fler

3) Planerar du inköpen i förväg?
   a) Nej   b) Ja

Om ja: Hur?

4) Är du här för att:
   a) Handla en specifik vara b) kompletteringshandla c) Storhandla

---FAS 2--------------

Ifall kunden har inkluderat 1c) så frågar jag om jag får följa med Kunden in i affären och ställa några frågor medan kunden handlar. Här är det individuellt vilka frågor som ställs.

Hur avgör du vilket märke du väljer (om det finns flera att välja mellan)?

Hur väger du ekologiskt emot priset ifall det är stor skillnad? Hur väger du ekologiska produkter mot andra produkter för övrigt?

Finns det vissa saker du undviker att köpa helt? Om ja, varför?

Om det uppstår frågetecken runt en vara, t.ex att information angående pris, innehåll eller ursprungsland inte finns, hur löser du det?

Använder du dig av it-teknik före och/eller under ditt handlande? Om ja, hur?

Vilken information brukar du ofta leta efter för en vara? Varför?

Hur hittar du information om en vara när du är i butiken?

---FAS 3---------------

32
Fas 3 är frågor efter att kunden har handlat:
Vad innebär miljövänlighet och hållbarhet inom mathandel för dig?
Handlar du tillräckligt med ekologiskt/hållbart livsmedel? Om nej, vad saknas för att du ska handla mer ekologiskt?
Känner du till några märkningar? Vad tycker du om dem?
Vad är den största bristen inne i dagens matbutiker?
8.2 References


