



Project Report **EatMe – I'm low carbon**

Team	Philip Böhm Fabio Bove Linus Huss Paul Thillen Johannes Wüllenweber
Tutor	Dominik Irber Josef Oberndorfer
Mentor	Dr. Hannes Petermeier

„It's not like it's always in my head“ or „I usually don't go grocery shopping, my partner does that“ are just two examples of typical answers our project group „EatMe – I'm low carbon“ received when walking around the pedestrian area in Munich. We asked people whether they were considering their CO2 footprint during grocery shopping. It was exactly this attitude of somehow having heard about ecological implications of one's food consumption but not acting accordingly that inspired our project. With the hypothesis that „better informed consumers will take a product's ecological footprint into account for their purchase decision“ in mind, we set out to make a tangible difference by raising awareness of the ecological implications of people's diets.

“There was a great atmosphere of common enthusiasm and constructive discussions. This was certainly crucial in ensuring our project's success despite the obstacles we

In the beginning, our team consisted of a group of thirteen students, motivated by the common topic „decision processes in the food industry“. We kicked off the team-building process, highlighted in a workshop by Miss Prehofer, with a beautiful day at a climbing garden in August 2016. Supporting each other at challenging points and succeeding in overcoming obstacles together got the spirits up. Nevertheless, bringing together the interests, passions, and skills of thirteen young and idealistic students is obviously quite a challenge. Therefore, we decided to split up into two smaller, more specific interest groups for efficiency reasons. Our sub-team decided to take a closer look at how people care about the CO2 footprint – as one aspect of the general ecological footprint – in their food consumption, hence the name „EatMe. I'm low carbon!“. At first, the projected outcomes seemed clearer to us than they turned out to be in the end. For example, one team member had a „clear imagination of a mobile application that people would use during their shopping to scan barcodes.“ In the project evolution, unexpected events provided opportunities for re-examining our initial idea and redirecting our efforts to viable outputs. In fact, we ended up nowhere near the initial idea. But let us get back to the beginning.

As a project start, we created a survey regarding existing knowledge about the CO2 footprint and ways that consumers would like further information about it to be made available to them. The aim was to get a clearer image of what people actually need and want. After a hard fight with EVASYS settings, our team managed to launch and even complete the survey shortly after the Christmas break. At that point, with the results of the survey in hand, the idea of creating a mobile app died. For the participants of the survey, a smartphone app would have been only the fourth most desirable option of getting information. On the other hand, a vast majority wanted more information about their food with respect to ecological implications. Thus, instead of trying to somehow still justify developing an app, our team reacted to the outcome by steering our efforts in the direction of a poster that could be displayed in supermarkets. For consumers, information presented directly on food packaging would be a more immediately accessible source of information, but we considered that the realization of such a goal would be unachievable in the limited amount of time available to us. Applying the concept of „SMART“ goals that Miss Prehofer suggested in a workshop on project management helped us in setting realistic goals. After having agreed on the desired outcome, our team quickly started working on it.



Panel discussion at "acatech am Dienstag"

Yet, the next experience was a huge setback. Realizing that existing data was either sparse or extremely complex, our team had to adjust the scope of our project. Rather than analyzing certain food types in depth, we decided to give a high-level overview of various types of food. During this data-gathering phase, we ourselves were repeatedly surprised by facts. Did you know that consuming cheese generally causes more CO₂ emissions than eating chicken? Or that rice production is emitting CO₂ not because of its transportation routes but because of the way it is grown?

Throughout the project time, we had constantly to evolve and re-think our ideas while still managing to advance the project. Our whole team agreed that „a great atmosphere of common enthusiasm“ as well as „lots of constructive discussions“ were crucial in ensuring the project's success. Nevertheless, there were also phases of low productivity. That was the case especially at points where we struggled with „too many reportings, due dates and obligatory meetings/workshops, which slowed down the progress of our project,“ as one team member phrased it, giving voice to a common thought among the whole group.



Our team from left to right:
Fabio Bove,
Philip Böhm,
Linus Huss,
Paul Thillen,
Johannes Wüllenweber

An unexpected opportunity arose through the network of the TUM: Junge Akademie when our team was presented with the chance to participate in an event of the series „acatech am Dienstag.“ We teamed up with Prof. Dr. Thomas Hofmann, Senior Vice President of TUM and leading researcher in food-related biotechnology, to give the audience different perspectives on food consumption.



Scan the QR code to get to the team's video!

A short sketch about conscientious food consumption and CO₂ labelling at the buffet afterwards distinguished our presentation from standard talks. We were very pleased by the approval and encouragement we got from the attendees.

A second meaningful highlight was the making of a video in Munich's pedestrian area. The video can be watched by scanning the QR code. Hoping to make people reflect on the issues involved, we interviewed random passers-by on their knowledge about and concern for their CO₂ footprint. Switching sides and getting the „very interesting new experience of being in the role of an interviewer instead of the spectator“ gave our team members highly interesting impressions.

We have tried to improve awareness and actual knowledge about the CO₂ footprint. Spreading the word about that topic in the forms of a talk, a video, and miniature versions of the designed posters has not only proved educational to our team but has generated actual value in making people think about their food decisions. After all, the most important thing is not that every single decision is made in favor of a smaller CO₂ footprint but rather that people actually start thinking about what implications their food consumption has. Hence, we were happy when one of the interviewed people left with the words „thanks for telling me, this definitely made me think.“ Mission accomplished!

Abstract

Quantifying the ecological impacts of human nutrition is a complex challenge. Based on the product carbon footprint, our information poster enables consumers to improve decision-making processes when buying food.

Background

Imagine yourself on a Saturday morning in the supermarket, shopping for groceries for next week. While you are walking through the aisles richly packed with an incredible variety of products, you are making an important decision every second – although lacking most of the knowledge and information you would need for a successful decision-making process. Standing in front of the vegetables, you might be wondering whether you should choose oranges from Spain, kiwi fruits from Italy or apples from Germany to fulfill your vitamin requirements with the smallest ecological footprint. Maybe the German apples have been stored in a refrigerated warehouse for months, making their resource consumption per kilogram larger than the environmental footprint caused by transporting the oranges from Spain to Germany? Should you buy yoghurt in a reusable glass or in a lightweight plastic container? Which one has a smaller ecological footprint, soy tofu or organic meat from a local farm?

Approximately three quarters of consumers in Germany experience uncertainty and indecision when buying food.¹ These decision-making processes are connected to significant financial expenditures: in 2014, the average German household spent 285 euro on food each month.² At the same time, human nutrition makes up a considerable share of global greenhouse gas emissions. The complex value chain of food production, from cultivation, harvest and processing to transport, supermarket sale and refrigeration in a private household, causes so-called “direct” emissions. In addition, “indirect” emissions due to land-use changes further increase the environmental footprint of nutrition. Deforestation for palm oil cultivation in Southeast Asia is a prominent example of indirect greenhouse gas emissions connected to food consumption.

Complex production chains and diverse environmental impacts make it hard to reliably quantify the ecological consequences of human nutrition. Within the 28 member states of the European

Union, agriculture alone has a 10 % share of total greenhouse gas emissions (figure 1).³ When considering the total value chain from the farmer’s field to the dinner table or landfill, food consumption is estimated to be responsible for approximately 30 % of greenhouse gas emissions in Europe.⁴ These numbers show that research into the quantification of food’s environmental impact and the associated consumer behaviour is highly relevant. In addition, building consumer awareness within this area can play an important role in mitigating greenhouse gas emissions and tackling climate change.

Goals and methods

Our project pursued two key goals:

1. To develop a better understanding of consumers’ knowledge and behavior in relation to food’s ecological footprint
2. To build awareness among consumers for the importance of food’s ecological footprint by designing an information tool

Our two key goals also defined two consecutive project phases, each characterized by a distinct set of methods.

In our first project phase, we initially conducted an extensive literature search to understand existing approaches for quantifying food’s ecological footprint. The resulting overview of existing studies, key aspects and consumer behavior characteristics served as a groundwork for formulating our hypothesis: Better informed consumers will take a product’s ecological footprint into account for their purchase decision.

Based on this hypothesis, we designed a consumer survey to get a better insight into awareness of and knowledge about the term „ecological footprint.“ Furthermore, we aimed to understand how such knowledge potentially influences consumers’ decisions when buying food. To allow for correlation calculation, we used the Likert scale for most of the questions. Additionally, we used multiple choice questions to allow participants a choice for their favored option(s). Aware of our survey’s explorative character, we also introduced several open questions where the participants had the opportunity of giving us further input. We intentionally tried to acquire participants from different social backgrounds to ensure a

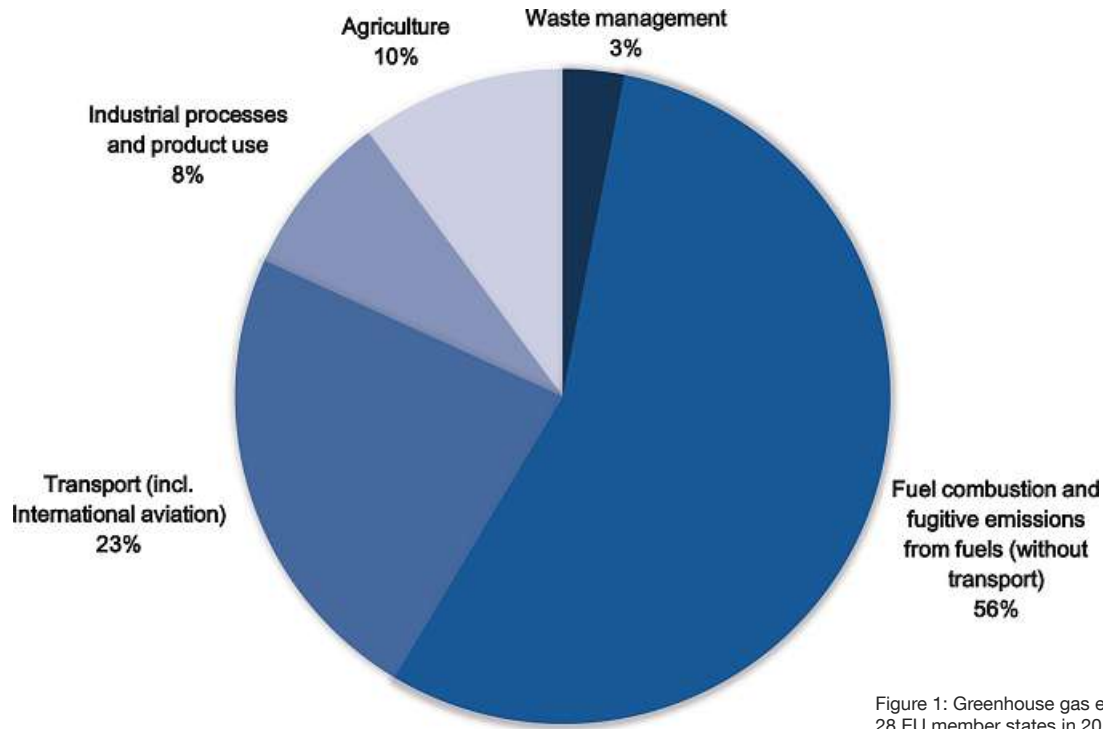


Figure 1: Greenhouse gas emissions of the 28 EU member states in 2015, by source sector.¹

diverse survey population. By offering the survey online as well as offline we were able to achieve a total of 243 participants.

In addition to quantitative customer surveys, we also conducted two expert interviews. An interview guide was carefully designed to ensure purposeful questions and high information density. We interviewed two researchers at the Technical University of Munich, Dr. Norman Siebrecht (Chair of Organic Agriculture and Agronomy) and Christian Wolf (Chair of Wood Science), who are both experts in the quantification and analysis of agriculture's environmental impact.

The second project phase aimed at increasing public awareness and improving the transparency of a product's ecological footprint for the customer in the supermarket. Here, an important method was the establishment of fruitful partnerships with public institu-

tions and private companies. We employed personal networks and designed a one-pager for a convincing presentation of our project work when contacting potential partners via e-mail or telephone. In the development of our information tool, iterative prototyping based on direct customer feedback also constituted a major part of our methodology.

Outcome and discussion

In general, the ecological footprint "measures humanity's impact on ecosystems in terms of resources used to satisfy human needs." It describes a "ratio of human demand for natural capital and the planet's capacity to sustain it."⁵ For the quantification of a food product's ecological footprint, various metrics with different units can be employed. Frequently used metrics⁶ are

1. Energy intensity: measures the net fuel-energy consumed to provide the heat and power requirements for the production process
2. Water consumption: measures the amount of fresh water, excluding rainwater, consumed per unit output of the production process
3. Greenhouse gas emissions: measures the amount of carbon dioxide equivalents emitted per unit output of the production process

Using a chosen metric, a product's ecological footprint can be quantified by means of a life cycle assessment (LCA). A LCA comprises a detailed inventory of a product's value chain to assess environmental impacts associated with all the stages of its life (figure 3). In the context of food, most research and quantification attempts are focused on the product carbon footprint (PCF). The PCF measures all greenhouse gas emissions along the food's life cycle and is indicated in kg CO₂ per kg of a specific food product.⁷

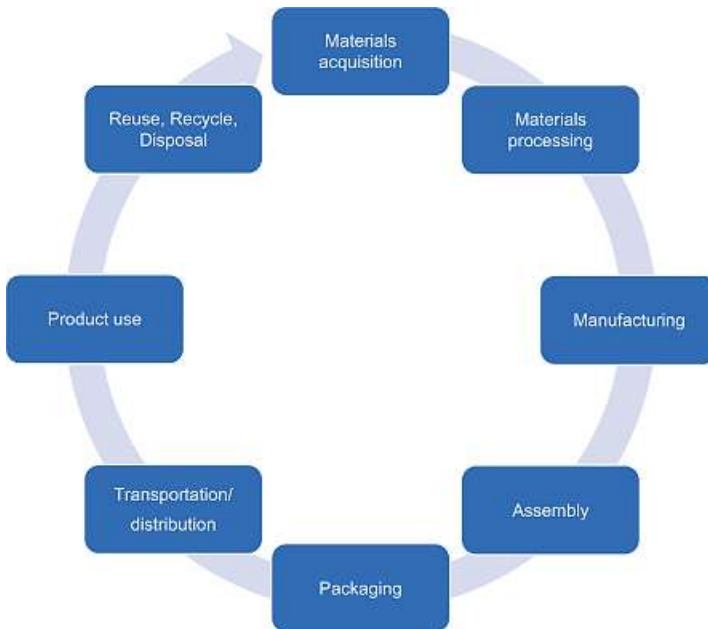


Figure 3: A Life Cycle Assessment (LCA) quantifies the environmental impact of each stage of a product's life.

However, there is a controversial debate around the suitability of the PCF for reliably quantifying a food product's sustainability. In most general terms, sustainability includes environmental, economic and social dimensions. However, the PCF does not consider important social criteria, such as social justice, human and labour rights, and it neglects environmental pollutants apart from greenhouse gases. These limitations of the PCF model have been confirmed in our expert interviews: Dr. Siebrecht stressed that greenhouse gas accounting was only a very small aspect of the huge idea of sustainability. Mr Wolf underlined this problem with the example of firewood: it has comparatively low CO₂ emissions as a fuel, but releases high concentrations of particulate matter when burned.

On the other hand, various reports have also emphasized the potential benefits of using the PCF as a sustainability metric. For example, a pilot study conducted in Germany has come to conclude that a "transparently documented product carbon footprint creates a stable foundation for a targeted product communication to improve climate-friendly consumption."⁷ The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety has highlighted the necessity for developing better assessment standards and including relevant social and economic considerations in the PCF.^{8,9} However, further research "could transform the product carbon footprint into a useful tool to increase consumer awareness and identify possibilities of reducing greenhouse gas emissions in cultivating, processing, transporting and storing food."⁸ After careful consideration, we have therefore decided to focus our development of an information tool on the PCF while constantly taking its limitations into account.

Our survey of 243 consumers produced several interesting results. For example, the majority of interviewees estimated that their purchase decisions have a medium to high impact on climate change; likewise, more than 50 percent are willing to pay a higher price for an eco-friendlier product. We found that roughly 86% of all participants would find it „good“ or „very good“ to have more information attached to the packaging about how „environmentally friendly“ the food is, whereas less than 60% stated the same for information about the „ecological footprint.“ Hence it could be inferred that people do not connect this latter term to eco-friendliness. The most favored means of information delivery

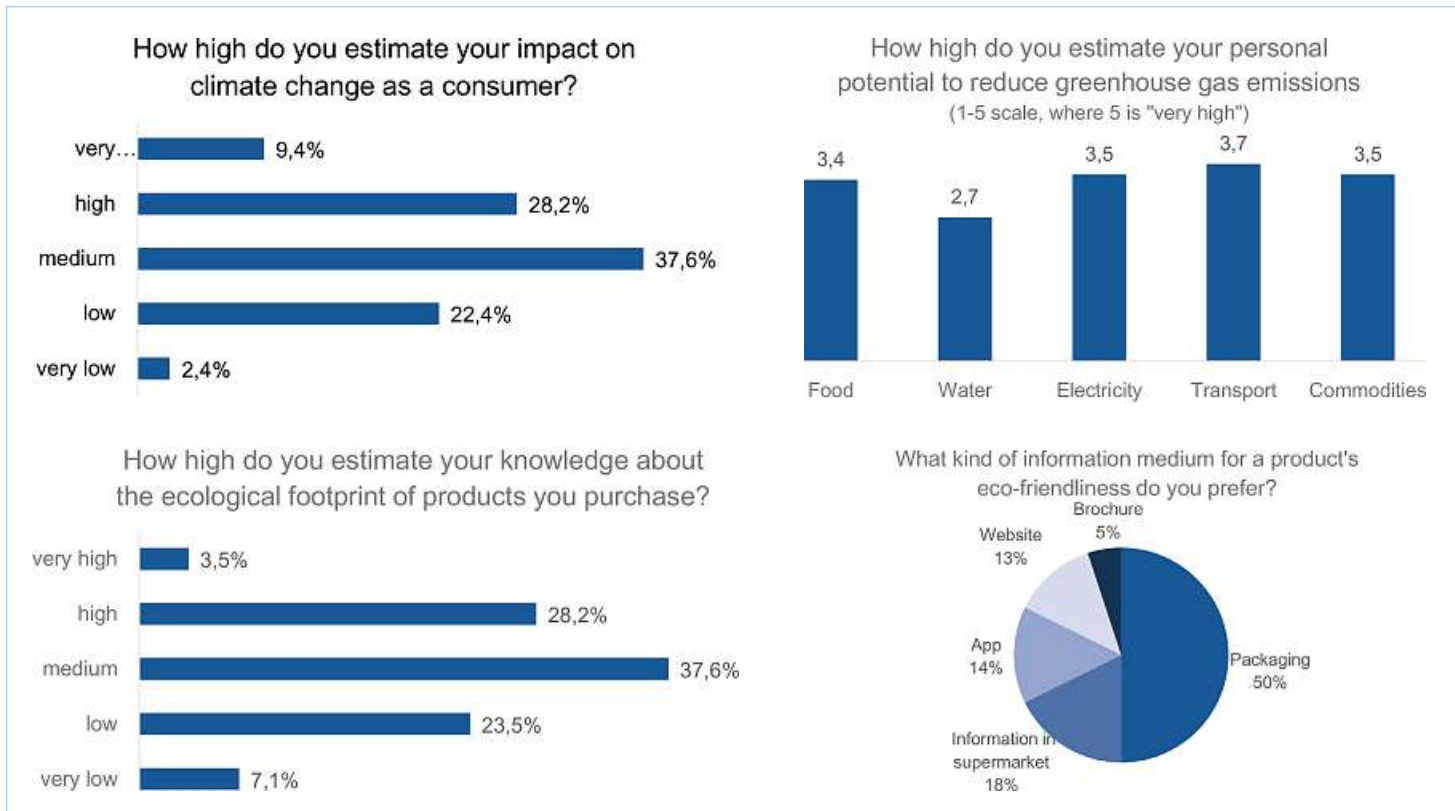


Figure 4: Key results of our consumer survey.

is on the food's packaging, followed by informational posters in supermarkets and via an app or website. This is contrary to our initial expectation that most would prefer an app or a website as their first information source. When looking at the kind of food that consumers want more information for, the survey shows that fruit, vegetables, and meat/fish are on top of the list. We also found that more than 88% would be willing to pay more for food that is more environmentally friendly.

Based on the results of our literature research, expert interviews and customer surveys, we designed an information poster for consumers in the supermarket. Our poster aims at increasing consumer's understanding of the PCF in the context of food, and gives specific advice for buying less carbon intensive food products. To make our information tool as effective as possible, we designed it according to pre-defined criteria: simplicity, ease of distribution, focus on graphical representations and colorful illustrations, low cost and opportunities for further information about the topic (figure 5). Important research results presented on our poster are:

1. Organic, seasonal and regional cultivation of tomatoes emits 0.035 kg of CO₂ per kg of tomatoes, while conventional farming in heated greenhouses causes 9.3 kg CO₂/kg of tomatoes.¹⁰
2. Beef production amounts to 16.9 kg CO₂/kg, potato cultivation to only 0.5 kg CO₂/kg.¹¹
3. The amount of food thrown away in Germany each year accounts for 22 million tonnes of greenhouse gas emissions.¹²

To increase the impact of our information poster in building consumer awareness, we pursued two key activities. Firstly, in a partnership with the National Academy of Science and Engineering ("acatech"), we organized a successful discussion evening about sustainable food production with Prof. Dr. Thomas Hofman (Chair of Food Chemistry and Molecular Sensory Science, TUM) as key speaker. In addition, we produced a video as a starting point for a social media campaign or educational tool: passers-by in the Munich pedestrian area were quizzed about the carbon footprint of different food products in a fun and interactive way, and were presented with one of our posters at the end (figure 6).

Summary and future goals

The product carbon footprint (PCF) measures all greenhouse gas emissions along the life cycle of a food product. Our literature research and expert interviews have shown the limitations of the PCF as a sustainability indicator for nutritional choices, but also demonstrated its potential usefulness to improve consumers' understanding of food's ecological impact. The customer surveys highlighted that many consumers wish for more detailed information about the eco-friendliness of a specific food product. Our information poster gives specific and simple advice to consumers for reducing their carbon footprint in the supermarket. The discussion event at acatech and our awareness-building video provided starting points for increasing the public engagement with the topic.

To ensure our project's positive impact on decision-making processes related to food products, we have two future goals:

1. Implementation of a distribution strategy for the information poster in supermarkets and iterative optimization.
2. Integration of the video into a social media campaign or educational tool.

Furthermore, there is also a pressing need for further research and policy implementation. An international standard for assessing the PCF is crucial to ensure a global and transparent comparison between products. In addition, the suitability of the PCF metric for quantifying sustainability needs to be improved by integrating social and additional ecological aspects. And, lastly, political measures are necessary to ensure reliable and accessible life cycle assessment data for any food product. This is a key requirement for successful employment of the PCF as a tool for improving consumers' decision-making processes in the long term.



Figure 6: Link to our video „Your carbon footprint: do you think about it?“

Acknowledgements

Our project could not have been completed successfully without the support of a variety of people. We would therefore like to thank:

- our mentor Dr. Hannes Petermeier and our tutors Dominik Irber and Josef Oberndorfer for their valuable guidance and constructive criticism over the course of one and a half years
- Dr. Norman Siebrecht and Christian Wolf for sharing their expert knowledge with us
- Georgia Samaras and Dr. Michael Penkler for their very helpful seminar on methods of qualitative research
- PD Dr. Marc-Denis Weitze (acatech) for giving us the great opportunity of presenting our work to an interested audience
- Prof. Thomas Hofmann for his thrilling talk at the acatech event
- Ulrich Leyermann for designing our information poster
- Martin Prankl for producing our video
- Prof. Gerhard Müller, Peter Finger, Maria Hannecker and all members of the TUM: Junge Akademie for providing a supportive and dynamic environment where ambitious ideas can be brought to life

Bibliography

- [1] SGS Institut Fresenius, “SGS-Verbraucherstudie 2014,” Hamburg, 2014.
- [2] Statistisches Bundesamt, “Laufende Wirtschaftsrechnungen: Einkommen, Einnahmen und Ausgaben privater Haushalte 2014,” Wiesbaden, 2016.
- [3] Eurostat, Greenhouse gas emission statistics. [Online] Available: http://ec.europa.eu/eurostat/statistics-explained/index.php/Greenhouse_gas_emission_statistics.
- [4] A. Tukker et al., “Environmental Impact of Products (EIPRO): Analysis of the Lifecycle Environmental Impacts Related to the Total Final Consumption of the EU-25,” 2006.
- [5] S. O. Idowu and N. Capaldi, Eds., Encyclopedia of corporate social responsibility. Heidelberg: Springer, 2013.
- [6] J. Schwarz, B. Beloff, and E. Beaver, “Use Sustainability Metrics to Guide Decision-Making,” CEP Magazine, pp. 58–63, Jul. 2002.
- [7] PCF Pilotprojekt Deutschland, c/o THEMA1 GmbH, Ed., “Product Carbon Footprinting – Ein geeigneter Weg zu klimaverträglichen Produkten und deren Konsum?,” 2009. [Online] Available: <https://www.oeko.de/oekodoc/883/2009-007-de.pdf>.
- [8] BMU and BDI e.V., “Produktbezogene Klimaschutzstrategien – Product Carbon Footprint verstehen und nutzen,” Berlin, 2010.
- [9] BMU, Umweltbundesamt, and Öko-Institut e.V., “Memorandum Product Carbon Footprint,” Berlin, 2009. [Online] Available: http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Produkte_und_Umwelt/memorandum_pcf_lang_bf.pdf.
- [10] A. Grabolle and T. Loitz, Pendo CO₂-Zähler – Die CO₂-Tabelle für ein klimafreundliches Leben. Munich: Pendo Verlag, 2007.
- [11] M. Carlsburg and S. Noleppa, “Nahrungsmittelverbrauch und Fußabdrücke des Konsums in Deutschland: Eine Neubewertung unserer Ressourcennutzung,” Berlin, Mar. 2015.
- [12] S. Noleppa and M. Carlsburg, “Das große Wegschmeißen: Vom Acker bis zum Verbraucher: Ausmaß und Umwelteffekte der Lebensmittelverschwendung in Deutschland,” Jun. 2015. [Online] Available: http://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/WWF_Studie_Das_grosse_Wegschmeissen.pdf.

EatMe

Decision-making processes concerning food consumption.

Buying food is an everyday activity for most of us. Yet the choice of food has become a highly emotional topic in our western society.

We want to analyse what unconsciously and consciously drives people when it comes to the decision of buying a certain foodstuff.

Imagine yourself on a Saturday morning, shopping the groceries for next week. Are you walking through the abundantly packed aisles of a supermarket or do you prefer to visit your local farmer's market?

Which criteria are influencing your decision for a particular product when buying apples, yoghurt, eggs or coffee?



BACKGROUND

In 2014 the average German household spent 285 euro on food each month [1]. At the same time, the decision-making processes concerning food consumption have become increasingly difficult as consumers are confronted with a high variety of products and influenced by a general range of factors. This has led to many newly demonstrated in a field study by Columbia and Stanford University when confronted with an extensive array of 24 choices of jam or chocolate, consumers show much greater difficulties and less satisfaction with their decisions than for a limited range of six choices [2]. Furthermore, the awareness of food consumption is increasing in today's European society. For example, numerous EU initiatives have come to the fore to promote healthy nutrition and reduce diseases caused by a poor diet [3]. In a recent poll around half of German citizens have stated that they pay attention to a balanced nutrition [4]. While requirements and regulations are becoming increasingly precise as well. Since food consumption is responsible for approximately 28 % of greenhouse gas emissions in Europe [5], another important aspect to consider is sustainability. In addition, consumers today want to enjoy today's food as required, being fresh or organically produced. The interaction of all these aspects makes decision-making processes concerning food consumption highly complex, multi-layered and often subconscious. That complexity is addressed by the fact that about three quarters of consumers in Germany experience uncertainty, indecisiveness and distrust when buying food [6]. Therefore, this is a highly interesting area of research with a significant potential for improving decision-making processes.

1. Statista, 2015. 2. Hoyer, MacInnis, Pieters, 2009. 3. European Commission, 2014. 4. Statista, 2015. 5. European Commission, 2014. 6. Statista, 2015.

MEMBERS Fabio Bove, Philip Böhm, Max Leon Hecker, Lukas Huss, Gerold-Johanna Klöbe, Sebastian Launer, Sophie Petersen, Carolin Pfadria, Alina, Lukas Rall, Paul Thillon, Konstantin Matthias Paul Wolf, Johannes Wüllenweber
TUTORS Benedikt Josef Oberndorfer, Dominik Ibrer
MENTORS Dr. Hannes Peltmaler



EatMe. I'm Low Carbon.



ABSTRACT In the first phase of our project we decided to deal with the product carbon footprint. Following up on our project plan we carried out a survey to find out if people even want more information on this aspect of their food. And if so, what kind of information they want and in what form they want it.

BACKGROUND

Imagine yourself on a Saturday morning, shopping the groceries for next week. Standing in front of the vegetables, you are wondering whether you should choose oranges from Spain, Kiwi fruits from Italy or apples from Germany to fulfil your vitamin requirements with the smallest ecological footprint. Maybe the German apples have been stored in a refrigerated warehouse for months, making their resource consumption per kilogram larger than the environmental footprint caused by transporting the oranges from Spain to Germany? You don't know.

If you have already struggled with a similar scenario, you are part of about three quarters of consumers in Germany who experience uncertainty and indecisiveness when buying food [1]. Since in 2014 the average German household spent 285 euro on food each month [2] and food consumption is responsible for approximately 30% of greenhouse gas emissions in Europe [3], this is a highly interesting area of research. Therefore, we want to understand how a food's ecological footprint influences consumer's decision-making processes.



GOALS AND METHODS

The survey's aim is to get an overview of the dispersion of and the knowledge about the term "ecological footprint". Furthermore, we designed it to get some insights about how this knowledge potentially influences consumer's decisions when buying food. To allow for comparison calculations, we used the Latent scale for most of the questions. Additionally, we used multiple choice questions wherever we wanted the participants to tell us their favored options. Knowing that our survey has an explorative character, we also introduced several open questions where the participants get the opportunity of giving us further input. We intentionally tried to get participants from different social mixes to account for a diverse survey population. By offering the survey online as well as offline and by seeking out diverse places we hope to achieve this goal. By our final evaluation date we expect more than 200 participants.

OUTCOME AND DISCUSSION

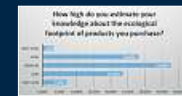
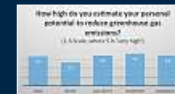
In the first sittings of our data we could include 85 online participants. Therein, we found that roughly 86% of all participants would find it "good" or "very good" to have more information about how environment-friendly the food is, whereas less than 60% stated the same for the ecological footprint, attached to the packaging. Hence it could be an inference that people don't connect this term to eco-friendliness. The most favored way of information delivery is on the food's packaging, followed by informational posters in supermarkets and via app or website. In fact that is contrary to our expectation that most would prefer an app or website as their first information source. When looking at the kind of food that consumers want more information for, the survey shows that fruits, vegetables, and meat/fish are on top of the list. We also found that more than 80% would be willing to pay more for food that is more environment-friendly. These results are preliminary however, because the offline questionnaires aren't included yet.

SUMMARY AND FUTURE GOALS

After successful completion of our survey over the product carbon footprint and the first expert interviews, we have a rough overview over the status quo and the know-how of the ecological footprint in our society. After further thorough analysis of the importance of the product carbon footprint for the decision-making process of the customers, we would like to proceed in our project. Thus, we are going to contact several companies associated to ecological footprint of food in order to establish a cooperation ensuring mutual benefits. Furthermore, more expert interviews based on previous results will be conducted. This will be our knowledge base and it will all advect into our practical concept for the improvement of the awareness for the product carbon footprint. Therefore, we would like to implement either a mobile phone application, a homepage with information on the ecological footprint or brochure for the freshmen starting at the Technical University of Munich in fall 2017.

SOURCES: 1. Statista, 2015. 2. Statista, 2015. 3. European Commission, 2014.

MEMBERS Philip Böhm, Fabio Bove, Lukas Huss, Paul Thillon, Johannes Wüllenweber
TUTORS Dominik Ibrer, Josef Oberndorfer
MENTORS Dr. Hannes Peltmaler



JANUARY 2017

Poster 1: Annual Conference 2016

Poster 2: Evaluation Day I

EatMe. I'm Low Carbon.

ABSTRACT Building on our consumer surveys and expert interviews, we are currently working on the two key challenges of conducting a reliable life cycle assessment for a food product and presenting its results to the consumer in a precise, but understandable manner. A poster, website, smartphone application or social media campaign are possible tools to transform our results into increasing public awareness for the ecological footprint of nutrition.

HYPOTHESIS Better informed consumers will take a product's ecological footprint into account for their purchase decision.

GOALS AND METHODS
Our goal is to increase public awareness for the ecological footprint of food and improve the transparency of a product's life cycle assessment for the consumer in the supermarket. We have started the process by conducting consumer surveys and expert interviews in order to establish a knowledge base about the existing attitudes, ideas and assessments of food's ecological footprint (Figure 1). Building on this knowledge, we have started a cooperation with OpenData GmbH, a consulting and software company focusing on product life cycle assessment. With their openCA software in combination with the Probat database of the German Federal Environmental Agency we aim to conduct the life cycle assessment of a few selected food products as indicated for an exemplary value chain in Figure 2. This will provide the building blocks for developing the prototype of a tool which transparently tracks the product's life cycle assessment for the consumer in the supermarket.

OUTCOME AND DISCUSSION
The consumer surveys have produced several interesting results. For example, the majority of interviewees estimated that their purchase decisions have a medium to high impact on climate change. However, more than 50 percent are willing to pay a higher price for fair trade products. Our first expert interviews with Dr. Norman Sieberich (Chair of Organic Agriculture and Agronomy, TUM) and Christian Wolf (Chair of Wood Science, TUM) have revealed the complex challenges connected to the life cycle assessment of food and the option of sustainability. In particular, the close consideration of a product's greenhouse gas footprint is far from sufficient for providing a sensible measure of its eco-friendliness. The two key challenges of conducting a reliable life cycle assessment and presenting its results to the consumer in a precise, but understandable manner will therefore be in the focus of our work with the openCA software and the development of our tool's prototype.

SUMMARY AND FUTURE GOALS
Having built a knowledge base of consumer surveys and expert interviews, we will now conduct a detailed life cycle assessment of a few selected food products using the openCA software. This will form the basis for our tool in the form of a poster, website or smartphone application (Figure 3). However, as the establishment of a cooperation with a supermarket turns out to be difficult, we could also launch a social media campaign about food waste and sustainable nutrition in order to increase our project's impact. In addition, we are organizing a discussion event about sustainable food production in the TUM city of the Hainhofstraße Academy of Science and Engineering (together with Prof. Thomas Hofmann (Chair of Food Chemistry and Molecular Sensory Science, TUM) as key speaker.

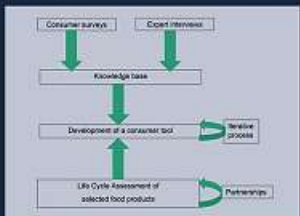


Figure 1: Schematic representation of our working process.




Figure 2: The dairy value chain as an example for the general methodology of a food's life cycle assessment using the openCA software.





Figure 3: Smartphone app showing a 'low carbon' label for a product.

MEMBERS Philip Böhm, Fabio Bovi, Linus Huss, Paul Thillen, Johannes Willemeber
TUTORS Dominik Ibrer, Josef Obendorfer
MENTORS Dr. Hannes Peltzmaier

inspired by 

JUNE 2017

Poster 3: Evaluation Day II

EatMe. I'm Low Carbon.

How can we improve consumer awareness for the ecological footprint of food?

ABSTRACT Quantifying the ecological impacts of human nutrition is a complex challenge. Based on the product carbon footprint, our information poster enables consumers to improve decision-making processes when buying food.

GOALS

1. Develop a better understanding of consumers' knowledge and behavior in relation to food's ecological footprint.
2. Build awareness among consumers for the importance of food's ecological footprint by designing an information tool.

HYPOTHESIS
Better informed consumers will take a product's ecological footprint into account for their purchase decision.

TEAM STRUCTURE AND PROCESS
After an extensive literature research, we designed a consumer survey to get a better insight into the public's ecological footprint on consumers' purchase decisions. We also conducted expert interviews with two researchers at the Technical University of Munich, Dr. Norman Sieberich (Chair of Organic Agriculture and Agronomy) and Christian Wolf (Chair of Wood Science). This second project phase was focused on iterative prototyping, partnership building and direct consumer feedback to develop our information tool.

OUTCOME
The ecological footprint "measures humanity's impact on ecosystems in terms of resources used to satisfy human needs." In the context of food, most quantification attempts of the ecological footprint are focused on the product carbon footprint (PCF). The PCF measures all greenhouse gas emissions along the food's life cycle and is indicated in kg CO₂ per kg of a specific food product.¹ This metric has the advantage of being simple to understand and comparatively easy to calculate, but is limited to showing one small aspect of sustainability: the PCF does not consider important social criteria and neglects environmental pollutants apart from greenhouse gases.

Key results of our customer survey with 243 participants are shown in Figure 1. Our information poster, which aims to improve consumer awareness and give helpful tips to reduce one's ecological footprint when buying food, is explained in Figure 2.

In a partnership with the National Academy of Science and Engineering ("acatech"), we furthermore organized a successful discussion evening about sustainable food production with Prof. Thomas Hofmann (Chair of Food Chemistry and Molecular Sensory Science, TUM) as key speaker (Figure 3). In addition, we produced a video as a starting point for a social media campaign or educational tool: passers-by in the Munich pedestrian area were queried about the carbon footprint of different food products in a fun and interactive way, and were presented with one of our posters at the end (Figure 4).

FUTURE GOALS
As education constitutes the ideal starting point for sustainable and positive behaviour changes in society, we are currently establishing a partnership with the State Institute for School Quality and Education Research (ISB). Our goal is to develop educational activities and materials which enable primary and high school students in Bavaria to develop an awareness for the ecological impact of food production.

Figure 1: Key results of our consumer survey.

Figure 2: Key elements of our information poster.



Figure 3: Discussion event at acatech (from left to right: Prof. Thomas Hofmann (TUM), team members Paul Thillen and Fabio Bovi, Uli Wenger (Bavarian Broadcasting, BR)).



Figure 4: Please scan the QR code to watch our video.



MEMBERS Philip Böhm, Fabio Bovi, Linus Huss, Paul Thillen, Johannes Willemeber
TUTORS Dominik Ibrer, Josef Obendorfer
MENTORS Dr. Hannes Peltzmaier

inspired by 

OCTOBER 2017

Poster 4: Annual Conference 2017