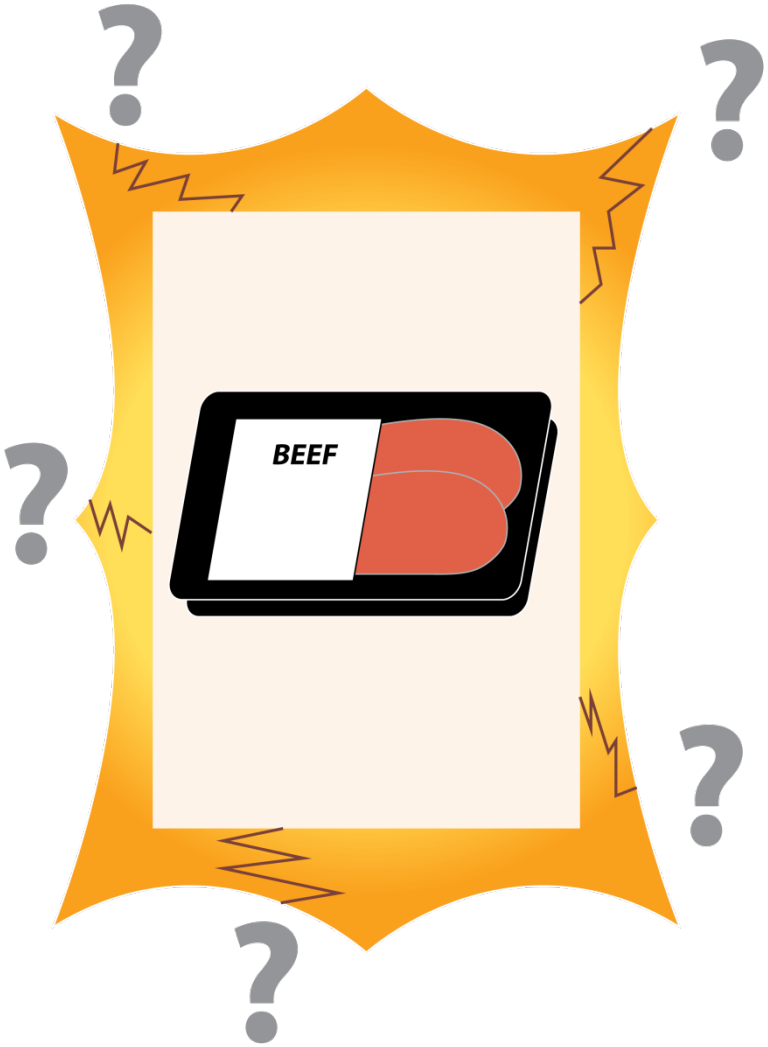
Promoting environmentally conscious food consumption

Re-framing the market of food products to include a visual *quality* for valuation



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ABSTRACT

The concerns for the state of our planet have forced us to consider the impacts we have on the environment and how we can reduce it. The production and consumption of food are some of the largest contributors to global environmental change. It is becoming alarmingly obvious that our environment and climate is changing. This has drastically increased the awareness and concern of consumers about our environmental impacts. The consumers want to reduce their environmental impact, also in their consumption, but lack the tools necessary to make the change.

The aim of this thesis is to equip the consumers with the necessary tools for making environmentally sustainable consumption choices. To this end, I have investigated the challenges and possibilities for designing an environmental label for food products. Through the collection and use of empirical data, review of the relevant scientific literature and the current public debates as well as application of the *multi-level perspective* framework and *marketization* theory, I have described the dynamics of how pressures from concerned consumers and the lack of tools for evaluating environmental impacts of food products have created a knowledge gap and subsequently destabilised the market. I propose that an environmental label may help re-frame the market and allow the consumers to make environmentally sustainable choices. For an environmental label to be successful it needs to overcome a range of challenges. In this thesis, I have investigated the challenges and their potential solutions in order to present a set of criteria for the design of an environmental label. These include the choice of environmental impact categories, how environmental impacts should be communicated, who should be responsible for implementing and managing the label and how the visual design of a label could be presented.

Implementing an environmental label is a tremendous task. And while this thesis presents several important aspects and concerns that need to be addressed, it is only a single step towards the solution. It is my hope that this thesis can be a valuable starting point for future endeavours towards a solution that will reduce the impact we have on the environment.

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I would also like to thank the interviewed experts from the Danish Ministry of Environment and Food, from Coop Danmark A/S, from Dagrofa Aps and from the Department of Agroecology, Agricultural Systems and Sustainability at Aarhus University for their contribution with essential knowledge to the process.

A thank you should also be sent to my colleagues at PlanMiljø for assisting me with connection to the retail industry and relevant experts through their network.

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1. INTRODUCTION

Human beings need air, water and food in order to live. These fundamental and basic needs are provided by our planet and its incredible ecosystems of animals and plants. Through our evolution the human race has developed increasingly efficient ways of getting the needs fulfilled. This has freed up time and biological capacity to become the most intelligent and powerful creatures on the planet. It has also made it possible for us to develop impressive technologies that continue to make our lives easier. These technologies allow us to fly around the world and to move around at much higher speeds than any other beings on the planet. Technology has also made it possible to produce large amounts of food without the need to go hunting or grind our own flour. This again frees up time for further research and development of even more technologies and studies.

Unfortunately, this continued technological advancement and optimization has facilitated previously unseen rates of population growth, which is slowly destroying the planet. After decades of industrial prosperity and novel technologies, we now face the consequences. Much of our technology has been developed without thinking about their environmental impacts (largely because we did not know) which causes imbalance in the ecosystems. We now know that ecosystems are finely tuned and sensitive networks that are highly affected by these imbalances and thus facilitate unsustainable conditions resulting in extinction of species. Furthermore, it is now broadly accepted that the human way of life has had detrimental impacts on our climate, which has lead to damaging natural catastrophes and an insecure future for the species of our planet – including humans.

This has made the environment and especially the climate topics placed high on the scientific and political agenda. Now more than ever, scientists are striving to figure out how to develop new technologies that can improve the state of the planet. Supported by new research and technology, politicians attempt to regulate and affect behaviour changes towards more sustainable conduct. In 2016, all the 193 member states of the United Nations committed to improve sustainability at multiple levels through agreement of 17 Sustainable Development Goals (SDGs). Each of the goals cover a subject such as: 'No poverty', 'Zero hunger' or 'Responsible consumption and production' and each further include targets and indicators that are involved in these processes (United Nations, 2019). These goals also cover a range of sustainability challenges and strive to secure the interdependent areas of economic, environmental and social sustainability before 2030. Even though the SDGs are high on the political agenda and strongly motivate research of many new technologies and innovations, we are unfortunately not performing better than we did a few years ago in many areas, especially when it comes to the climate and maintaining biodiversity (Karkov, 2019).

One of the primary goals of the SDGs is to increase sustainability within the food production and consumption sectors. The production of food is the largest contributor to global environmental change (Willett et al., 2019). 40-50 % of the habitable land of our planet is estimated to be used for agriculture, of which 77 % is devoted to livestock production, including feed production, pasture and grazing and the remaining 23 % are used for other crops (UN Environment, 2019; Willett et al.2019). With the current estimated increase in the world's population, it will require a 50% increase in our food production to meet

the need of the approximately 10 billion people expected to populate the planet by 2050 (UN Environment, 2019). If we do not change our way of food production and consumption, the increase in required agricultural landmass will irrefutably lead to more deforestation and subsequent loss of biodiversity.

The current focus on climate change and other environmental issues has escalated to become an issue in the minds of many consumers and not just for scientists and lawmakers (Preus et al., 2017). Unfortunately, the connection between climate change and personal consumption is hard for most consumers to comprehend (Hartikainen et al., 2014). For most consumers, the steps and processes involved in the supply chain of food production are a black box. Most consumers only interact with food products when they shop for groceries in the supermarket. Thus, the consumer is only exposed to the information that is available on the products or in advertisements which is quite limited in regard to environmental sustainability. So while the consumers are just bringing home a piece of food – they unknowingly expose the environment to all the impacts of the entire production process.

The production of food has devastating impacts on the climate and other environmental elements, especially the production of meat (Preus et al., 2017; Tukker et al., 2006). Hence, changing our habits and consumption behaviour can have great potential to reduce this impact. In order to change the consumption of food towards a more climate and environmentally friendly path, we need to make a change in the market of food products. Changes can be made at many places along the supply chain, and multiply changes might be necessary for a faster and more powerful transition (Trolle et al., 2019).

As consumers we play an important role in the market. Our decisions, assumptions and habits are what decide the selection in the supermarket and thus which products will impact the environment. As such, motivating and helping consumers to buy the most sustainable products would likely have a great effect on reducing the impact of consumption. However, while the ultimate choice between different products lie with the consumer, other actors can affect their decisions. For instance, the supermarket plays a major role as they decide which products are made available for the consumers to buy and how they are presented. Several surveys and studies show that the consumers want to choose more environmental friendly products - but have difficulty identifying these products (Preus et al., 2017). Food products are in many countries required by law to inform the consumers about the weight, the ingredients and potential allergens contained in the product. But no regulations require producers to state the environmental impacts of their products. This makes it almost impossible for the consumer to deduce how they can reduce the impact of their consumption. The knowledge gab is wide open.

Information about products is gained through their *qualities* (as described by Callon et al., 2002). For food products, these *qualities* include the price, taste, look and labels on the products as well as the information that can be found about the product in the media and even through social networks. The term *quality* further describes how they occur from processes of qualification and re-qualification done by various market actors related to the product, thus makes it a central term to be used in this report.

1.2 Research question

The aim of this thesis is to investigate the possibilities for implementing a new *quality* on food products in order to deal with the knowledge gap between consumers and goods regarding their environmental impact. This will be done by answering the following research question:

What are the challenges and possibilities for designing a *quality* that communicates the main environmental impacts of food products?

- **How does environmental concern among consumers change the markets and can introduction of a *quality* stabilise the changing markets?**
- **What environmental impact categories are most important for food products?**
- **What challenges must an environmental *quality* overcome to be successful?**

2. RESEARCH STRATEGY AND METHODOLOGY

In the following, I will elucidate my research strategy of how to investigate communication of environmental impacts in the context of food. However, I will first and briefly explain my choice of subject and point of departure.

2.1 Point of departure

Reducing the environmental impacts of our way of life motivates me at many levels - as a student of sustainable design, as a frustrated consumer, as a member of a family and as a concerned citizen.

Sustainable designers cover many subjects and approaches. I am a sustainable designer who is curious on innovations that create a more sustainable world than the one we live in now. I strive to develop concepts, systems or products that assists people in behaving more sustainable. I believe that our behaviour needs to change in order for us to overcome the impending crisis, that our perceived needs, values and resulting consumption has caused.

As a consumer and a member of a family with several food allergies, I have become used to scrutinize the products I buy in order to figure out what they communicate. I have been left wondering why I can easily see what a product contains of ingredients and how this is distributed on fat, sugar and carbohydrates. But nowhere can I see how the production of the product impacts the environment. The same goes for my role at a citizen afraid of what is happening to our planet and the consequences of our relentless consumption.

Why did I explain this? Because my role as a sustainable designer and my private roles have merged through my last years of studying. As students, we are constantly encouraged to question the way things are and determine if we can make them better – being more efficient, more sustainable or more usable. My frustration with my inability to choose environmental sustainable products when shopping despite my academic insight into the subject and my concerns for the environment has led me to this project. So while I do my best to preserve my professional objectivity, I recognize that my work is inevitably affected by my personal choices including the subject and my choice of methodology and theories.

2.1.1 Design is a way of knowing

Design thinking has become a well-known human-centred design approach – where the intangible work designers perform is placed in a systematic approach adoptable by all (Kimbell, 2011). In contrast, the *designerly ways of knowing* explains how design work is based on the inherent capabilities that designers have obtained during their education, practice and training (Cross, 2006; Johansson-Sköldberg et al., 2013).

Cross (2006) highlights the ability to tackle ill-defined problems as one of the major aspects of the designerly ways of knowing. My research question aims at investigating and answering the ill-defined problem: How to design a *quality* that states the environmental impacts from food products. In this context, ill-defined characterises both the problem and the unclear solution this problem might have. The

direct effects of our consumption and way of life are impossible to visualise. We are beginning to see the results of our environmental impacts, but how they directly connect to our actions is hard to comprehend. How can natural disasters be linked to choosing beef over vegetables in the supermarket? Thus, the problem is difficult to frame and the effect and success of the proposed solution is difficult to assess.

Design is many things. For some, it is a creative discipline where tools, colours and material are in play. For others, it is the establishment and creation of a system or a mobilization of a network of actors. For us, as sustainable design engineers, it is how to create intelligent and relevant solutions through designs that deals with unsustainable situations. Design is also the ability to communicate information and knowledge though design. In other words, to make sure that, through the design, the knowledge is understood by the receiver. The offset of this project did not emerge from a need to create an elegant and well-designed graphic element for marketing purposes, but rather as a concern for the environment. I wish to provide the consumers with a tool for making conscious choices by filling out the knowledge gap between food products and their environmental impacts. Therefore, in this context, design is to provide the knowledge needed to make a new *quality* that equips the consumer to make conscious choices.

2.1.2 Examine the market of food products in a multi-level perspective

In order to guide the analysis, I will first frame the research area and problem in the overall context of environmental changes. This will be done using the *Multi-level perspective* (MLP) model proposed by Geels & Schot (2007).The MLP model consist of three levels: *The socio-technical landscape*, *the socio-technical regime* and finally *the niche innovations*. This sets the issue of food consumption and potential changes in a broader context and exemplifies how affecting stabilized socio-technical regimes can be difficult - but lead to sustainable transitions.

MLP connects the three included levels and illustrates the dynamics that occur between them. However, it does not provide a framework for specific change nor the creation of new regimes or niches. In order to analyse the market of food product (considered as a regime in MLP), I will utilize the *Marketization* framework proposed by Çalışkan & Callon (2010). This framework consists of five elements that are essential to consider when establishing or re-framing markets. MLP and *Marketization* will be further explained in chapter 3. In the final part of the analysis, I will elucidate the elements of the Life Cycle Assessments (LCA) in order to define the important categories that should be communicated.

2.2 State-of-the-art

With this point of departure and strategy for the further work, I will start by introducing the field of which I will be investigating and contributing to. The research will especially be concerned with labelling for environmental aspects, since labels are an often used *quality* for communication on food products.

Environmental labelling is not a new concept. The topic has been investigated at many levels with different approaches, product categories and resulting suggestions. Nonetheless, very few solutions have been introduced and allowed to persist on the market, particularly in the contexts of environmental labelling of food.

In the following, I will present the recent research within the topic of environmental labelling. To reach a coherent and in dept level of the topic, I will both include studies on general labelling of product for environmental promotion, but also draw on studies more specific to food and meat. This will create a base for the research in this thesis.

2.2.1 Barrier 1 & 2: Consumer perceptions and the lack of knowledge

The issue of climate change is high in the public consciousness. You can hardly read a newspaper, listen to a radio show or watch the news without encountering at least one story concerning our changing climate or the environment. Consequently, the environmental impact of our life style is a growing concern for the consumers, and many consumers wish to live more environmentally sustainable. Unfortunately, environmental sustainability is a complex topic covering multiple areas of concern, including water pollution, greenhouse gas emissions, destruction of biodiversity etc. In a recent report from the Danish think tank CONCITO, they state that the consumers lack the knowledge and express confusion regarding the CO_2 footprint of different products and the meaning of the different food labels (Minter & Chrintz, 2016). Several studies state that the consumers are unaware that a change in their food consumption habits can have a great impact on their environmental footprint (Hartikainen et al. 2014; Galatola & Pant, 2014; Feucht & Zander, 2018). This lack of knowledge and understanding is an important barrier to deal with in the quest for behavioural change through environmental communication. With the standpoint that the consumers do not care or know about the environmental impacts of food, some researchers even question whether an environmental label could have a worthwhile impact (Hartikainen et al. 2014). Indeed, Emberger-Klein & Menrad (2018) state,*"that carbon labels are generally not important in the consumers' decision-making process"* (p. 260). In addition to the general lack of knowledge of the subject, there are also several misconceptions and myths regarding which products are the most environmentally sustainable. Tests show that consumers tend to prefer locally produced food above other direct indicators of sustainable production (Feucht & Zander, 2018). A similar conception exists regarding organic products that are perceived as more environmentally sustainable than their non-organic counterparts – even if this may not be the case. Using a mix of psychological and lifecycle assessment studies, Tanner & Jungbluth (2003) have investigated why it is so difficult for consumers to identify the environmental impacts of food products. Their study suggest that integrating significant environmental information e.g. on a single label would encourage purchasing with environmental motives and support the consumers knowledge of environmental issues connected with food consumption. Due to the complexity and multifactorial state of environmental impacts, it is a highly challenge for consumers to compare products which may lead to both under- and overestimation of the environmental *qualities* of food products. This is both due to the lack of standardized information regarding the environmental impact of a product and built-in cognitive mechanisms which cause consumers to translate environmental knowledge in a wrongful manner (Tanner & Jungbluth, 2003). Thus, the barriers include 1) a lack of knowledge and 2) a general trend towards misconceptions that both need to be overcome to support the consumer's wish to reduce their environmental footprint.

2.2.2 Barrier 3: Ensure the trust of consumers

The increased attention and growing concern regarding both the changes in our climate and the impact our way of life has on the environment are important drivers for implementing changes in our behaviour. Unfortunately, the desire to be more environmentally sustainable can be exploited by companies if the

consumers do not have sufficient knowledge or access to the required information. Such exploitation is known as 'green washing' (Peattie, 2015). 'Green washing' is when production companies present the environmental benefits of their products in a selective, biased or undocumented way, in order to increase their sales. Some products have statements or signs, that use words such as 'green', 'natural', 'eco' etc. Unfortunately, are these claims are not always supported by evidence or specific information. At best, this leaves the consumer misinformed, but at worst such marketing increases the confusion and scepticism of the consumer towards environmental labelling. This creation of mistrust is highly detrimental towards supporting environmentally conscious consumption. Studies have shown that consumers express a high degree of mistrust towards the environmental claims stated on products (Harris, 2007). To overcome this barrier and ensure that claims on products are truthful, validated and standardized, new regulations and guidelines regarding environmental labelling are being discussed and provided such as the report on Environmental Claims by the European Commission (2013). This report points to the rights of the consumers to be presented with correct and easily interpretable information: "…*consumers should be supported in easily identifying the truly sustainable choice, and have the right to know the environmental impacts throughout the lifecycle of the products they intend to buy"* (European Commission, 2013, p. 4).

The existing mistrust in environmental labels, at least partially, due to 'green washing' has lead the focus of some researches toward other approaches for ensuring sustainable consumption. These alternatives include nudging and more education on the environmental impact of food in schools (Feucht & Zander, 2018).

2.2.3 Research approaches and suggested solutions

Determining the contents and expression, as well as evaluating the impact and potential success of a label is not an easy task. Within the field of environmental labelling, it is common practice to use surveys and focus groups to elucidate the perceptions of consumers, including their intents and values (e.g. Feucht & Zander, 2018; Grunert et al., 2014; Hartikainen et al. 2014). Different pilot projects have been conducted to test sketches of labels aiming to communicate environmental impact, carbon footprint, sustainability score or similar measures. However, none of these projects have been deemed as successful solutions for environmental labelling of food. To determine what a label should display and express, Cho (2015) evaluated two advertisements featuring a selection of environmental parameters of a product: one with detailed information of five environmental categories on the product and a descriptive characterisation, and another simply describing the environmental characteristics of the product. The advertisements were judged and evaluated by consumers by a survey asking which they found to have the biggest impact on their purchasing decisions. The advertisement with the full information was judged to be the most impactful by the consumers (Cho, 2014). The relevance of detailed information is also supported by additional studies (Borin et al., 2011;Leach et al., 2016). However, others have found that a simple and easily understandable label is to be preferred, an example already implemented being the Swedish burger chain Maxi Burgers that has increased their sales of vegetarian burgers labelled with "Low CO_2" (Tan et al. 2012).

These opposing results could be due to different target groups in the studies. Alternatively, it could be due to different countries of origin, where environmental issues can be differently framed according to policy focus or economy. Finally, countries that have directly experienced the effect of climate changes may also respond differently than countries where climate change is still an abstract phenomenon. Borin et al.

(2011) posits that similar to the nutrition label, which is required on food product in many countries, it would be relevant to explore the possibility of stating environmental impact of key ingredients. They suggest that this needs to be done from a policy level demanding that all manufactures disclose the required information (Borin et al., 2011). The concept of displaying environmental impacts similar to the nutrition label is applied in one of the four labels tested by Leach et al. (2016). This study does not aim to determine the best label option, but to explore the levels of environmental details and the challenges within. Another popular test label utilises a traffic-light-coloured scheme to express the environmental impact of a product. In these labels, green indicates good, yellow indicates medium and red indicates bad environmental characteristic. Out of three designs tested by Sharp & Wheeler (2013), it was found that the traffic-light carbon label was the most favoured by consumers. This is supported in a subsequent study by Emberger-Klein & Menrad (2018), where a similar label is concluded to be most favourable.

Most studies rely on surveys to gain insights into the perceptions and knowledge of consumers. Some also conduct workshops and in-store surveys (Emberger-Klein & Menrad, 2018). However, very limited research can be found testing labels in actual markets such as supermarkets. Focus groups and surveys tend to evaluate the intent and how the consumers wish to conduct themselves. However, when actually faced with the decisions in a real life setting, such as in the local supermarket, many other aspects can affect the results and consumers will often act different than they thought they would in a simulated scenario (Grunert et al., 2014).

In addition to the form and function of a label, determining which environmental categories to communicate in a label is disputed and found to be highly challenging. Many studies focus on carbon footprints but some include other environmental categories. While researchers do not agree on which environmental categories are the best to display, most studies point out that the major challenge is how to balance the amount of information without scaring the consumers and the risk of oversimplifying, potentially leading the consumers to false conclusions about the impact of a product. Another challenge concerns whether a labels should be comparable between several categories or within a specific category of food (Sharp & Wheeler, 2013; Leach et al., 2016).

2.2.4 European and governmental initiatives

An ongoing initiative called the Product Environmental Footprint (PEF) aims to develop a methodology based on a life cycle assessment (LCA) approach to quantify the environmental impacts of products (Zampori & Pant, 2019). With this system the environmental impacts of goods and services can be clarified in detail. The hope of this project is that by elucidating the impact of the entire supply chain, the consumers can evaluate the environmental impact of the product. This will in turn motivate and make it easier for the producers to identify processes that can be environmentally optimized. The method is not isolated to food products, but also for non-food products. Until recently, the project has been in a development and pilot phase being tested in collaboration with different companies. At the time of writing, the project has moved on to a so-called transition phase, which aims to further develop the method and monitor its initial attempts of implementation (European Commission, 2019a). Whether the initiative will be mandatory for all companies or voluntary is still undecided (PEF, 2019). The project is quite comprehensive and the success of its further development will likely have great impact on the field as a whole. There are different opinions of whether the PEF project will succeed or not. Finkbeiner (2014, p. 266) claims that the *"PEF does not contribute to harmonization, but rather confusion, proliferation, and mistrust"*. Some of his critique rest

in the claim from the PEF workgroup that their method should be based on, and harmonized with, existing and well-established LCA systems such as the range of existing ISO schemes. However, according to his analysis, the PEF is, in itself, conflicting with several requirements of some ISO standards (Finkbeiner, 2014). In the Danish context, the project at its current status has received critique by market agents, claiming that their suggested implementation will be too confusing for the consumers and thus not have the desired effect (Fauerby et al. 2018). The PEF project is aimed to be applicable to all products and services. This requires comprehensive work to establish the system and the underlying framework.

In October 2018, and in line with PEF, the Danish government presented a Finance act allocating 24 million DKK to complete a campaign to facilitate climate friendly behaviour through labelling (Finansministeriet, 2019). Since this announcement, the Danish media has been filled with discussions from the food production industry, retail corporations and branch organizations as well as other interested actors. Most are interested in the proposition but remain sceptical towards the potential impact it will have. There is much of uncertainty connected with a label of this kind. In March 2019, the Climate minister Lars Christian Lilleholt announced that the idea of a climate label would be provisionally cancelled due to limited support from relevant market actors. This decision was made following a hearing, where most invited parties suggested that the money was better spent on presenting simple guidelines to the consumers on how to live in a more climate friendly fashion.

The public debates and the current literature within the fields of environmental labelling and sustainable food consumption, underlines the relevance of the issue and the importance of dealing with the challenges that our food consumption infer. It also highlights, that the issue is not easily solved as all involved actors are struggling to present good and implementable solutions that will help reduce the impending environmental and climate crisis.

2.3 Methods for empirical investigations

The methods chosen for the empirical work in this thesis are all qualitative and directed towards mapping out the research area both in regards to relevant actors and in regard to defining the most relevant environmental impacts for food products. In the following, I will list the methods and briefly explain their benefits and how they contributed to the work.

2.3.1 Review of scientific literature and current societal contributions

A thorough research on existing literature within the fields of environmental labelling, Life Cycle Assessments and consumer perceptions was conducted. The literature was identified within the broad range of databases accessible through the Aalborg University's library. Due to the ongoing debate, it became relevant to include research of public media about a climate label proposed by the government took place in the winter and spring of 2018/2019.

2.3.2 Field observations and market research

To investigate the field several supermarkets were visited to conduct observations of interior planning and presentation of food products. This was partially also done in order to prepare for the interviews conducted

with retail representatives. Further, a selection of products was chosen from different supermarkets to represent and investigate the current *qualities* on food products.

2.3.3 Interviews

Four interviews were conducted with relevant actors within the field. The interviews were semi-structured and very open for the directions that the interviewees lead the conversations. However, if the conversation went towards irrelevant topics, I would guide them back on track. The semi-structured way of interviewing makes room for follow up questions that could not have been planned before starting the interview.

The questions where based on initial research on the topic of environmental labelling and the public opinions of the persons to be interviewed. Based on this, the interviews were kept scientific and at a constructive level yielding relevant and up-to-date in-depth information about the field.

As the interviewer, I strived to be an active listener and give the interviewees time to reflect on the questions. This assured that they got to say everything on their mind about the topic. The interview lasted for 20-45 minutes and were all conducted on the phone, as the interviewees were all located in other parts of Denmark.

I interviewed two representatives from leading retail corporations in Denmark: Dagrofa (Dagrofa, 2019, Appendix 1) and Coop (Coop, 2019, Appendix 2). Both of the representatives have key roles within the CSR and environmental departments in the respective companies. Both were in positions of influence in regard to the directions the companies move and exhibited broad knowledge of the values within the companies. The focus of the interviews was to get insights into how retailers see their responsibility and role in promoting sustainable behaviour. Furthermore, the interviews aimed to elucidate which issues they foresee in the implementation of a *quality* for environmental impact.

To get a scientific view on the subject of labelling food products with their environmental impacts, I reached out to a renowned researcher from the Department of Agroecology at Aarhus University (AU, 2019, Appendix 3). She provided me with essential knowledge on the foundations for conducting LCAs. She also elucidated the challenges of using LCA results as tools for communication.

Finally, I also interviewed a Danish representative for the Product Environmental Footprint (PEF) (PEF, 2019, Appendix 4) project currently conducted by the European Commission. This interview aimed to get an update on the status and the development of the project as well as get first-hand information regarding the challenges and issues they have faced in the process.

These dialogs, in combination with the current literature, were highly valuable to reach a thorough understanding of the area and constituted a base for the further progress of the project. In addition to the included interviews, I reached out to Salling Group, Danish crown, The Danish Consumer Council and Ecolabelling Denmark. Of these, only Ecolabelling Denmark was able to partake but only had time for short answers by e-mail, referring me to a useful feasibility study on promoting the EU Ecolabel on food products.

All interviews where transcribed in order to structure the information given and relate the key points found across the interviews. Citations used in the report have been translated from Danish to English.

2.3.4 Design methods

In line with the approach of designerly ways of knowing and working with an ill-defined problem, the design process will be iterative and the outcome uncertain. To assist and guide my analytic work I utilised two renowned analysis frameworks: MLP (Geels & Schot, 2007) and Maketization (Çalışkan & Callon, 2010). These frameworks are described in more detail in the next chapter. The empirical and analytic work are a part of the design process where they constitute the foundation for the conceptualisation and design suggestion.

Along the investigative and analytic work, I have brainstormed and created hand drawn sketches to visualise my thoughts and ideas of a proposed product. Some of these sketches were further developed and digitally redrawn in Adobe Illustrator.

2.4 Limitation and clarification

When it comes to food consumption, there are many aspects of responsibility and sustainability – all of which are important. In this thesis, I will focus on the environmental aspects, while still keeping the social and economic areas in mind (as they are highly interconnected). I will focus on the private consumption and not consider purchases and consumption done within organisations and governmental institutions.

To allow the work included in the thesis to reach the necessary depth to be relevant within the hybrid forum around environmental labelling, I will only focus on promoting conscious consumption of food products. To further narrow the subject down, the most detailed analysis will be related to meat products, as this is the food category with the most detrimental impact on the environment. This category of food products is today much discussed due to its high impact on the environment and related to health problems, thus making it an interesting case for this project.
The initial thought was to gain a comprehensive understanding of the environmental impacts of the products by conducting LCAs. This quickly proved to be worthy of an entire project in itself. I thus decided to take a different approach that aimed to clarify the most relevant environmental impact factors for food products.

Many published studies have conducted empirical investigations of the consumer's perception of labels and environmental aspects. As their results and key data is available and probably more comprehensible than would be possible within the time frame of this thesis, I have deliberately abstained from conducting similar studies myself. I have instead focused on determining whether labelling environmental impacts is feasible and if so, how the area further could be developed.

3. THEORETICAL FRAMEWORK

As presented in the strategy chapter I have chosen to investigate the field of environmental labelling with focus on the market and on the technical possibilities. In this section, I present and elaborate on the applied theories that will be the core tools for the analysis.

3.1 Environmental transitions from the Multi-Level Perspective

Human actions are causing climate change and other environmental problems. Food consumption is one of the major contributors to this. This project aims to label food products to communicate their environmental impacts. Thus, it takes part in the transition needed to deal with the overall issue of climate change and environmental damages. To illustrate and explain the relation between this project and the overall challenge, I will use the *Multi-level perspective* (MLP) model (*figure 1*). MLP shows the dynamics of transitions by visualising the interactions at three perspectives termed the *Landscape*, the *Socio-technical regime* and the *Niche innovations* (Geel & Schot, 2007).

The *landscape* is the stable context from where actors can interact and it is to be seen as the background or foundation for the regimes and niches. In the context of this project, the most important landscape element is the environment and how it is changing in a negative direction. Unlike the landscape, the regimes and niches are dynamic and evolve through pressures from and interactions with the involved actors. The realisation that our environment is undergoing detrimental changes at the landscape perspective causes concerns that pressures the regimes and niches. This results in the development of innovations at the niche perspective (such as new and “cleaner” technologies) and attempts to regulate and improve existing elements at the *regime* perspective (for instance through “green” legislation or changes in the markets). At the regime level we have the existing dominating ways of innovating, producing and consuming. These are stable regimes that consist of systems that fulfil societal function in the linkage between social groups and rules (Ceschin, 2014). An example of such a system is the market of food consumption.

The *niche* level is where research and development can occur within an isolated space outside of the stable regimes. Successful niche innovations aim to interfere and change elements within an existing regime. While considered stable, these changes may eventually also reach and affect the landscape level. For instance, (niche) innovations that improve the sustainable conduct within the market (regime) will eventually be beneficial for the global environment (landscape).

In regard to driving change in the market, Callon (1998) describe *overflows* as important facilitators or motivators. Overflows are caused when negative (side) effects (or externalities) related to the market becomes of concern to the consumers. Relating this to the MLP model, the overflows are the pressures from the landscape level which affects the regime level (where markets are present) and the niche level (where innovations occur in protected spaces).

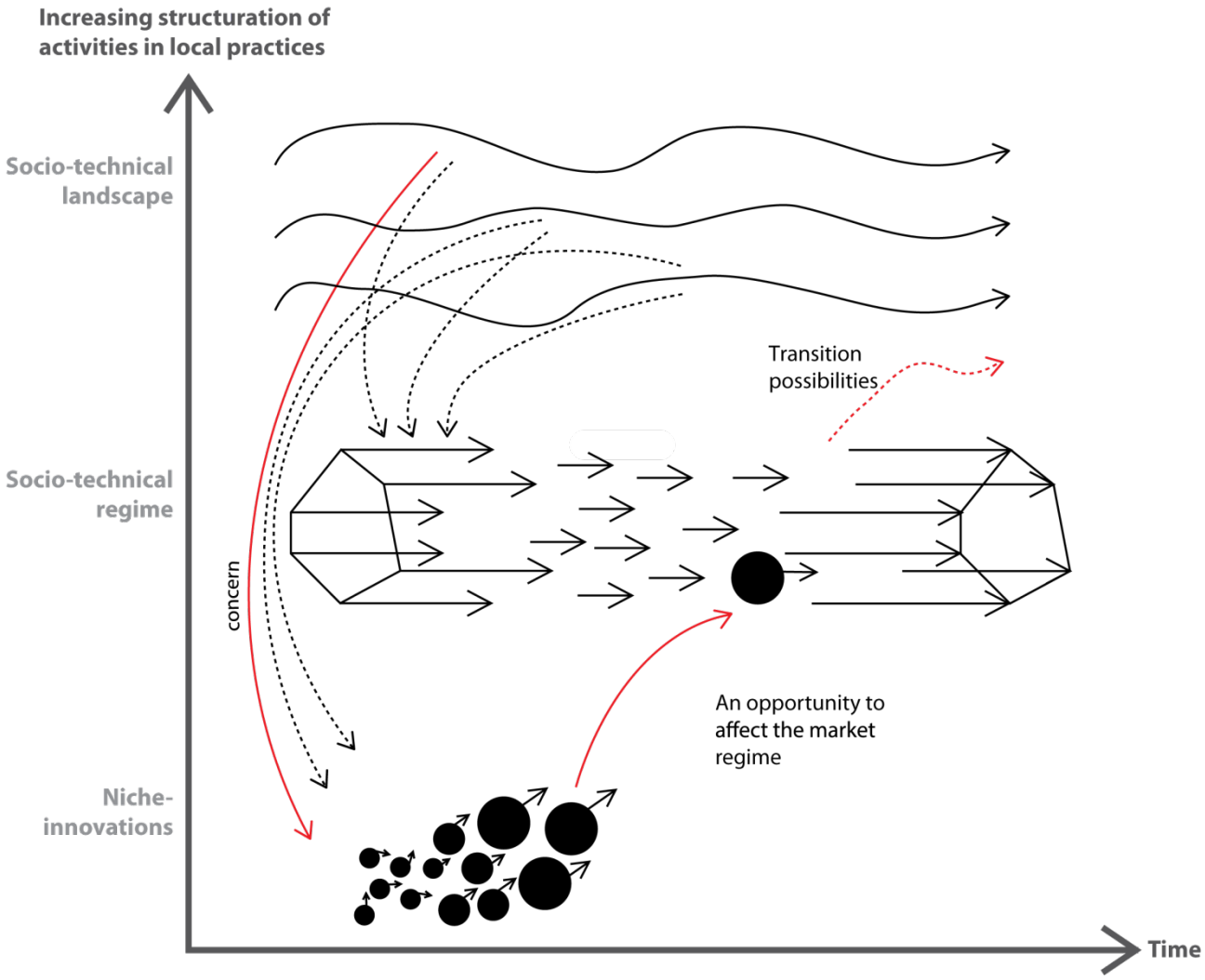

Figure 1. The multi-Level Perspective model, visualizing how concerns causes pressures from the Socio-technical landscape to the Socio-technical regime and Niche-innovations. If an innovation is successful it might be able to penetrate the regime and on the long term that might result in landscape changes. Own illustration based on Geels & Schot (2007).

3.2 *Marketization* – the re-framing of markets

The MLP model provides an overview to visualise the dynamics of sustainable transition. But as a theoretical model it does not detail how changes or innovations are to be introduced to best affect the specific regimes and landscapes involved in environmental sustainability. For this purpose, I will utilise the *Marketization* framework by Çalışkan & Callon (2010). *Marketization* is a theoretical model that provides the elements needed to guide the implementation of change into existing markets (re-framing) or the creation of new markets. Framing and re-framing are analytical approaches for defining or re-defining agents, goods and market encounters in their context. Framing describes how it is possible to analyse actions and connections happening between these entities in the market by seeing it as this contemporary static stage.

The focus in this project is how to reframe the market of food consumption. In order to do so, the notion of markets must be defined. Çalışkan & Callon (2010) define the markets as socio-technical arrangements by the following three characteristics:

1. Besides organizing the production and the circulation of goods, markets involve a monetary compensation which seals the shift in ownership along with transfer of the property rights attached to the good.
2. A market is a heterogeneous arrangement that seeks to deploy e.g. rules, technical devices, logistical infrastructures, discourses, narratives, scientific knowledge and skills in living beings.
3. A market is a space for confrontations and struggles of power distribution. It is a space where contradictory definitions, valuation of goods as well as agents oppose each other before the final transaction determined by price happens.

The definitions of markets further give rise to the question of how markets are established. According to Çalışkan & Callon (2010) successful *Marketization* requires consideration of five major elements:

1. Pacifying goods: Things in the market
2. Marketizing agencies
3. Market encounters
4. Price-setting
5. Market design and maintenance

These elements are important for understanding the market and how it is *framed*. Importantly, these elements clarify the areas where it is possible to exert control over the market design and create interventions. Thus, *Marketization* can be used as a tool for determining how innovations can be implemented to change the market. The order of the elements is arbitrary, as all the elements need to be considered. However, the first three are considered to be the most important in regard to analysing the market.

Callon et al. (2002) distinguishes between the terms: *Goods* and *products*. According to Callon et al., *products* are dynamic and always a part of a continuous process. This process includes its production, circulation and consumption, all of which implies a series of actions. In contrast, a *good* is considered as stable. For instance, a product in the supermarket is immobilised between the processes of circulation and consumption can, in this state, be considered as a good.

1. *Pacifying goods* concerns the process that allows a product to be valued and find its place in the market. In its basic form, markets consist of things to be valued and the agencies that value them. Before a good can be valued, it needs to be pacified. A good is pacified if it fulfils the criteria necessary for the agencies to value it. These criteria are set by the different agencies and will include the characteristics that are important for the given agency. Price and quantity are almost always important characteristics, but other characteristics such as nutritional values, impacts on health and where a good is produced can also be important for the valuation. When goods are present in the supermarket, they are in a pacified state as long as the criteria set by the valuating agencies (e.g. consumers) do not change. If the criteria for valuation changes, the good becomes unpacified as it can no longer be valued – at least not in regards to this specific *quality* that is considered missing.

2. *Marketizing agencies* relates to the various agencies or stakeholders that have the capability to act in the socio-technical arrangement of the market. The main function of markets is the exchange of goods for monetary compensation between agencies. As indicated above, the valuation of a good by the *marketizing agencies* is crucial for the function of a market. Consequently, making agencies equipped for this valuation is highly important. Under-equipped concerned agencies can be equipped by introducing new characteristics or *qualities* to the product such as a label. *Qualities* are given to the goods in a continuous qualification and requalification process. This continuous process is what maintains the uniqueness of a good and makes it different from other competing goods. Callon et al. (2002) term the *qualities* obtained through this continuous qualification and re-qualification process as the *singulaization* of a product. In addition to singulaization, competition between products is resolved by how consumers attach and detach from the goods being presented to them. Importantly, equipping the consumer does not necessarily also attach them to the good.

3. *Market encounters* define the space for the meeting between the agencies and goods (Çalışkan & Callon, 2010). Market encounters do not only happen in the supermarket where consumers and goods meet, but occur throughout the supply chain. In regards to the market encounters it is relevant to put attention to other elements that exists in these spaces of market encounters. These elements are assisting the agencies to interact with the goods and thus get the functions of mediators - it can be the shelves in the supermarket or advertisements of specific groups of products.

4. *Price-setting* is always the outcome of the struggles between the agencies that defines the goods. The different *qualities* proposed that end up defining the good, are defined by a price before being stable for market exchanging. Important is how external agencies outside the supply also can affect the pricing.

5. *Market design and maintenance* concerns the stability of the market structure. After changes have been implemented to the market (i.e. through re-framing) the structure of the market will inherently change. It is important to consider how the changes affect the market and make sure that a functioning structure is maintained.

4. ANALYSIS

The goal for this analysis is to investigate the concept of environmental labelling on food products, mainly focusing on meat production. By applying the framework of MLP and *marketization* from a designerly thinking perspective, I wish to shed light on the possibilities and barriers for changing consumer behaviour using environmental labelling.

4.1 Raising concerns – overflows in the market

The increased focus and urgency of man-made climate changes expressed in the media has greatly increased public awareness of the issue. While sceptics can still be found, more and more citizens are becoming increasingly concerned and willing to make changes in their lives to counteract the changes. These concerns are drivers for new initiatives that can reduce the environmental impact of our use of products. To set this in the landscape perspective of the MLP model, the increased awareness and focus on climate changes in our society has caused an overflow. In turn, this overflow pressures the niche level (including innovators) and socio-technical regimes such as markets, to change their focus and work toward providing new solutions.

4.1.1 Who raises the concerns?

The changes in our environment and climate have not happened over night, but have slowly emerged and accelerated over decades of increased consumption and population growth. Such gradual change is almost impossible for non-experts, such as the common consumer, to assess and understand. In such cases, the concerns need to be raised by the experts within the field which often consist of scientist and government officials. These are the only actors with sufficient knowledge and expertise in environment and climate data to correctly inform politicians and the public. Unfortunately, it may take a long time from the initial discovery of an issue until a solution is implemented. This is both due to difficulties in understanding the information and its consequences, as well as in determining the best solution. Concerns can be adopted by politicians that make law regulations, by researches or by consumers. D'Antone & Spencer (2015) has investigated the challenges in palm oil consumption following the increased awareness that emerged. They find that consumer awareness and initiatives towards solutions drastically increase when the consumers themselves start to investigate the problems using detailed information from the media. This study also provides examples of initiatives where individuals have used blogs to gather knowledge and subsequently disseminate their concerns making it easy for others to understand. Other examples describe how concerned consumers establish networks of likeminded individuals where information can be easily shared. Others even succeeded in mobilizing associations such as NGOs to gain increasing influence over the market. Lewandowska et al. (2017) use the term *lead users* for these influential consumers. Their results also highlight the importance for companies to recognise these *lead users* and be able to meet their needs. This is both due to the direct influence that *lead users* have on the public and due to the likelihood of their views to become mainstream for more consumers in the future (*figure 2*). This shows how different *agencies* can have different influences and possibilities of acting on these concerns. Even though the concern arises from the scientific data, the concerns from the consumers are what creates the pressures

and overflows in the system and are thus critically important to consider when investigating consumption. For these reasons, the perceptions of the consumers are of great interest and value to multiple market agencies (such as producers and retailers) particularly on sustainability issues. Thus, consumer surveys and focus groups are often and abundantly being deployed to help define how to frame new products.

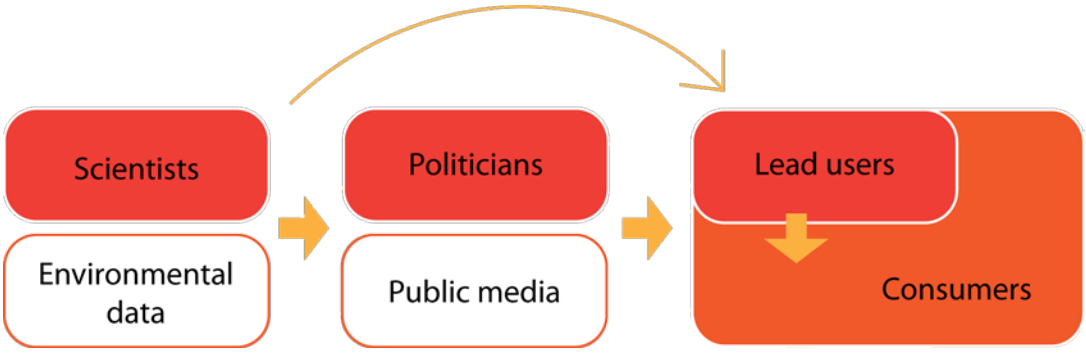

Figure 2. The process of how concerns can arise in the society often emerging from information that origin from research and is communicated through politicians and public media. But some lead users seek out information by them self due to their level of concern. Own figure

4.1.2 What is requested?

As highlighted in chapter 2, a major part of the requests of the consumers and value transparency in regards to the food they consume. This includes the ingredients of the food, but also concerns their trust in the production company and the retailers selling the products (Preus et al., 2017). There have been several examples of products not containing the claimed ingredients, such as added water or substitutions of types of meat. These scandals create scepticism and mistrust in the minds of the consumers, from which it can be hard for a company to recover. The consumers do not just require information regarding the food they buy to assure their personal health. They also have concerns for the environment and wish to take responsibility and assist in the struggle against environmental challenges (Preus et al., 2017). However, in a survey from the Danish think tank, CONCITO, it was found that 68% of the Danish consumers think that it is difficult to assess and compare the climate impacts of products (Minter, 2015). In another survey by Landbrug & Fødevarer (2017), it is noted that about a third of Danish consumers are unsure whether manufactures even consider sustainability in their production. This indicates that either the consumers are indifferent to the efforts of the manufactures or the manufactures fail to communicate the actions and initiatives they implement to promote sustainable production. The CONCITO survey also find that the consumers request responsibility from both the food manufactures and the retail corporations and expect them to strive towards more sustainable food consumption (Preus et al., 2017). Finally, framing products are further complicated by different demographics and regions having different concerns. For instance, the younger generation (25-34 years old) living in the Copenhagen area has greater focus on sustainable consumption than all other regions and age groups (Preus et al., 2017).

The concerns are arising from the landscape perspective of environmental issue such as climate change. This is causing major pressure on the existing regimes including the European Union, local governments as well as the market. These regimes in turn rely on new innovations emerging from the niche level to be

equipped to tackle these problems. Accordingly, the importance of dealing with environmental challenges are clear, but how to deal with it remains uncertain in many areas including the area of food consumption.

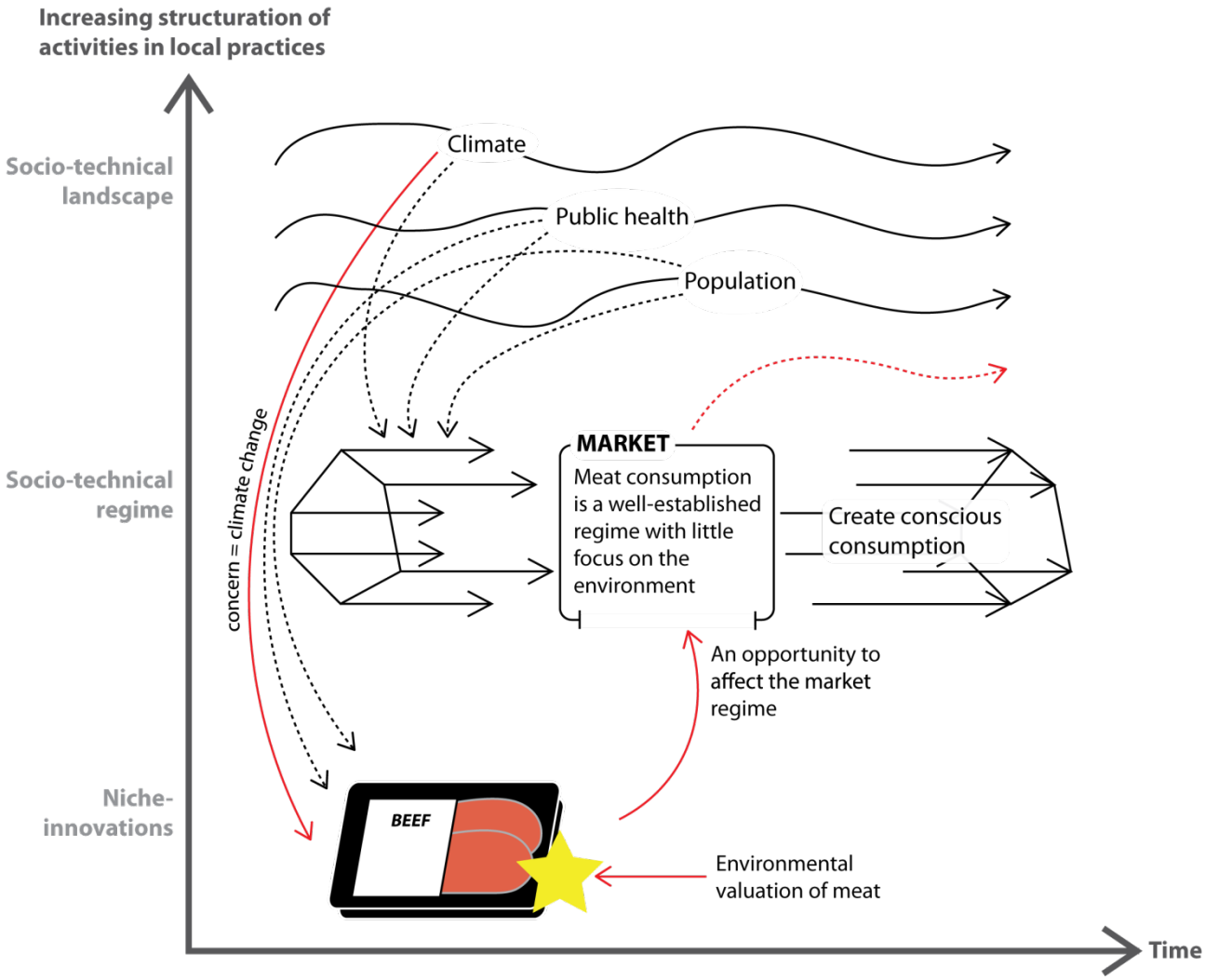

Figure 3. In the Multi-level perspective model the concerns about climate changes from the landscape level causes overflows and thus innovations emerges. This project is aims a creating a quality that can be implemented in the market of food consumption in order to encourage conscious consumption. On the long term this will hopefully participate in a sustainable transition.

4.2 *Marketization* and its role in environmental labelling

Establishment of a new *quality* in the market involves several processes that need to be taken into account. Çalışkan & Callon (2010) use the term *marketization* to describe these processes and propose the analysis of five basic elements to characterize the establishment of a market: 1. Pacifying goods, 2. Marketizing agencies, 3. Market encounters, 4. Price-setting and 5. Market design and maintenance. In the context of introducing a new environmental label, I have chosen to mainly focus on the first three elements, as pricing and maintenance are beyond the scope of my research questions.

4.2.1 Framing and pacifying goods

Valuation and comparison of products or goods by the consumer are crucial determinations of whether a product will succeed and stay on the market or not. Valuation of products is strictly dependent on the ideals and dilemmas of the target consumers. If new ideals or concerns arise, the parameters used in the valuation will change. To set in the context of the theories of Callon (Callon 1998; Çalışkan & Callon, 2010), a good is seen as framed or pacified as long as the consumer can value it. If new concerns arise and causes overflow, as is the case for the increased concern about environmental impacts, the products are no longer in a pacified state until they can be valued by the new criteria. This open the goods for re-framing – a state where products and their framing have the opportunity to be debated and improved. I will use this opportunity to investigate the challenges and barriers connected with introducing a new environmental *quality*.

The focus of the analysis will be on meat as this is one of the most environmental damaging food product. For health reasons, it is recommended to consume less than 500 g meat per week (Fødevarestyrelsen, 2019d). Nonetheless, in many developed countries a major part of the population exceeds this recommendation. Furthermore, the global meat consumption is rising due to increased income and population growth (Godfray et al., 2018).

Meat products have been a part the daily diet of most Danish consumers since they were kids. Thus, meat is deeply entangled in the network of socio-technical relations that constitutes the consumers world of values, perceptions and culture. However, new knowledge that meat is bad for the environment and resulting concerns are currently affecting this entanglement and reducing the amount of meat in the consumers shopping cart. Some use this to implement very radical changes in their life such as excluding all meat from their diet. Others are unsure of how to react to this incomplete information and continue to eat meat as they have always done. Some consider cutting down on their meat consumption but are unsure whether it really helps anything? At the same time, the discussions on what dietary constituents (such as proteins and vitamins) we will miss if we exclude meat form our diets is also creating concerns and doubts. This illustrates some of the many challenges there are in valuating meat products and how this leaves this food category in an uncertain state.

Visible *qualities* in the meat market

To be able to introduce a new *quality* it is crucial to know the field that it is to be develop for. There are many visible *qualities* (such as labels and statements) in the current market. In line with the aim of this project, I chose to focus on the visible *qualities* presented on meat products in the Danish supermarkets. To get an idea of the existing labels, I collected a range of different meat products from various Danish supermarkets (Appendix 6) and analysed their visible *qualities*. The resulting selection of *qualities* both highlight the established labels certified by third parties and the labels or statements placed on the products by the manufacturer. These manufacturer *qualities* are under less scrutiny and *quality* control but are used as part of the storytelling of the product by the retail corporation or manufacturer. These labels, together with additional advertising, are an important part of the framing of the products in the supermarkets. When presented on products in the supermarket, these *qualities* are competing to get the attention of the consumers.

Some *qualities* are mandatory according to Danish law or EU regulation such as the nutrition declaration, country of origin, ingredients, potential allergens and expiration date (Fødevarestyrelsen, 2019c). Most of these *qualities* are important in order for the consumer to assess the *quality* and health factors when buying this product.

The optional third-party *qualities* serve as a tool to provide additional knowledge for the consumer to act upon. The optional labels have a high degree of marketing value. Both governmental, the retail companies, NGOs and other organizations can be behind the optional characteristics. Besides the specific labels there are also other *qualities* in from of graphics and text added by the manufacturers.

Organic

The Danish red "Ø"-label is allowed on organic products produced under specific criteria and controlled by the Danish government. It is possible to place the "Ø"-label on organic products produced outside of Denmark, but it requires control by the Danish authorities (Fødevarestyrelsen, 2018). The label is known by 95 % of the Danish adult consumers and amongst them 90 % find it of high credibility (Økologisk Landsforeing, 2016). Among consumers, there are different values assigned to the concept of organic production. Some consumers buy organic products due to them being more healthy (Preus et al., 2017), others believe it to be a sustainable choice (Preus et al., 2017). Both the Danish and the European organic labels (*figure 4*) require least 95% organic ingredients and strict requirements for the remaining 5% (Europe Commission, 2019b; Fødevarestyrelsen, 2018).

Figure 4. The European and Danish organic labels.

Animal welfare

Meat and dietary products are derived from living beings and thus, unlike other food categories, have the aspect of animal welfare. The concern for animal welfare has lead to no less than three labels: the governmental "Bedre dyrevelfærd" (Fødevarestyrelsen, 2019b), a similar one called "Dyrevelfærdshjerterne" (Coop-dyrevelfærd, 2019) created by Coop and the "Anbefalet af Dyrernes Beskyttelse"(Dyrenes Beskyttelse, 2019) by the Animal Protection NGO (*figure 5*). Furthermore, the organic labels also cover elements of animal welfare (Nielsen, 2019). It is interesting and potentially detrimental when multiple labels concerning a similar topic exist in the market. Koos (2011) describes that if many similar labels exist while having small differences, it can be increasingly difficult for the consumers to understand the information they provide. Especially the two labels, "Bedre

Figure 5. Three labels regarding animal welfare.

Dyrevelfærd" and "Dyrevelfærd" where the degree of welfare is elaborated may prove difficult for many consumers to assess. Nonetheless, all three the labels ensure the consumers that the manufacturer considers animal welfare to some degree in their products.

Figure 6. The Keyhole label.

Keyhole label

The Nordic Keyhole label aims to present the consumer with "the healthy choice" (*figure 6*). The main criteria for the label are low content of fat, sugar and salt and high content of fibers and whole grains. This label is managed by the Danish Veterinary and Food Administration in collaboration with Icelandic, Norwegian and Swedish governments (Fødevarestyrelsen, 2019d). The label is voluntary to use and free of charge.

Danish flag

The Danish flag is used to highlight the origin of the product (*figure 7*). Meat needs to be labelled with country of origin according to Danish law (Fødevarestyrelsen, 2019a), but country of origin found on many products. This information is not providing the consumer with a lot of direct information but can be an important *quality* for some producers that prefer to buy "local" products. Country of origin could lead some consumers to consider what kind of restrictions the country has on additives to the meat or animal welfare, but most consumers lack sufficient knowledge about the differences in dietary legislation between countries to make this more than speculations. Stating country of origin can indicate the distance that the product has been transported (Lazzarini et al. 2018). This can indirectly help the consumer deduce how it was transported (i.e. by truck, by plane or by boat) and thus indicate the potential environmental impacts this transportation may infer.

Figure 7. Country of origin.

Qualities arise from concerns

Some of the mentioned labels have been around for a long time, while others have been introduced more recently. New labels or *qualities* tend to arise as a result of current concerns brought to attention of the consumers through the media and public debate. A few years ago, the media was filled with stories revealing the addition of high quantities of water to chicken meat. As a result, we today see labels that state "no water added" (*figure 8*). This sign is placed by the manufacturer in an

Figure 9. Quality regarding "no added water"

Figure 8. Qualities regarding "no antibiotics"

attempt to deal with the concerns rising in the society. A similar trend can be seen regarding antibiotics in the meat. Public discussion and articles suddenly emerge describing the vast amounts of antibiotics being used in the meat industry and that some even remain in the meat that we buy in the supermarket and could affects our health when consumed (Touveneau, 2018). And not long thereafter, new labels declaring their (lack of) use of antibiotics appear in the market (*figure 9*).

Without these *qualities*, it would be impossible for the consumers to know whether the good was produced conventionally or organically, what country it is from and when it is likely to go bad. By itself, the good (the meat) does not make it possible to values whether the animal has received medicine during its life or where it was slaughtered. That is why *qualities* on goods matters, some more than others depending of the agencies that value them.

None of the labels found on any meat products directly stated anything about their environmental impacts. For consumers that are familiar with the organic labels, might know that some of the criteria for this label also benefit the environment, such as limited use of pesticides (Andersen, 2017). However, other criteria, such as their increased space requirements per animal, can be less beneficial.

Many of current labels on meat products are established by governmental agencies (keyhole, animal welfare, organic). In a study from 2013 made by Konkurrence og Forbrugerstyrelsen, the consumer perceptions of 21 sustainability labels from the Danish retail market were investigated (Konkurrence og Forbrugerstyrelsen, 2013). The study concluded that the consumers prefer to have text following the label to make it easier to understand. Further, when asked where they primarily get their knowledge regarding consumer products, the majority refer to the packaging or from the newspaper, magazines or other media. This study also concluded that labels set by governmental agencies are preferred over labels from third-party organisations, such as NGOs. The survey did not provide a definitive answer to whether the consumers think there are too many labels already (Konkurrence og Forbrugerstyrelsen, 2013).

4.2.2 Marketizing agencies and the need to be equipped

In their proposed *marketizing* framework, Çalışkan & Callon (2010) term the actors involved in the definition and valuation of goods as the *marketizing agencies* and highlight the importance of knowing their diversity.

At each stage in the production process, the good is valued and defined. Even though it is the same product that is being valued though the supply chain its valuation can differ depending on the point of view of each stage. These differences in valuation depending on which stage the good is currently located, indicates how different agencies can value and define the goods in very different ways. The focus of this project is on the valuation process conducted by the consumers. But the other agencies within and from outside the supply chain provide relevant information in the defining of *qualities*.

Consumer: Perceptions, dilemmas and habits

As consumers we impose products with different values that relates to our interests and ideologies. For some consumers the most important *quality* is animal welfare, for others it is whether the product is organic or locally produced. For some it is the assurance of fair work conditions for the farmers in development countries. These different values are an important part of what make consumers decide which products to buy in the supermarket. And not all these values are in favour of the environment.

In the absence of sufficient information regarding sustainability and environmental impacts of the products, consumers are prone to make their own assumptions and ideas for which products may be best for the environment. For instance, due to the lack of better labels, many consumers tend to see organic products as the most sustainable choice (Christie et al., 2017). Similar trends can be seen with the Nordic Swan label (not currently on food) and products showing the Danish flag (Preus et al., 2017). While these labels all express certain *qualities* in the product, they are not necessarily guiding the consumers towards the most environmentally sustainable choice, even though the consumers may assume that they do. For instance, a dilemma could be whether it is more environmentally sustainable: to choose A) a conventionally and locally produced tomato from Denmark or B) an organic produced tomato from Spain. The lack of relevant information might lead the consumer to conclude that the Danish tomato would have the lowest environmental impact, but this might not be the case due to the increased energy requirements of greenhouse production. Thereby the consumers risk choosing products based on false assumptions which may be detrimental for the environment (Preus et al., 2017). Others might choose the organic products as they are considered "natural" and "pure". However, organic products often require more area for growth and produce far more waste in their production (in part due to their limited use of pesticides) (Trolle et al., 2019). Even when it is possible for the consumers to identify the product with the lowest environmental impact, they may still be met by a dilemma of whether to choose the most environmentally sustainable choice or the healthiest choice (Sengstschmid et al., 2011). These dilemmas and self-assessed conclusions of the consumers, makes sustainable food consumption difficult and confusing to understand and navigate in. Both the lack of information and the difficulty of interpreting the information can thus be barriers for sustainable consumption.

In addition to the lack of appropriate information, Minter & Chrintz (2016) also highlights habits as a barrier for sustainable food consumption. Even if the right knowledge is provided, a changing your choice of food still needs the right motivation. Increased sustainability in itself may not always be sufficient – additional motivators may be needed, such as monetary incitements (Minter & Chrintz, 2016).

As mentioned, I have chosen not to collect empirical data about the consumer's perception of sustainability or their current knowledge of the field. This choice was made due to the high numbers of studies and surveys already available on the topic as well as due to the low credibility inherent in such studies. As described by Lewandowska et al. 2017: "*Questionnaires and survey research can be powerful, but they are usually base on consumers' declarations and declarative information (the consumers are able to manipulate their answers).*" (p. 41). The values of the consumer (the *qualities* they use as guide for measuring goods) can vary from person to person, depending on the time of day, their health conditions and depending on possible influences from external sources such as social networks. In addition to being prone to manipulation, consumer surveys tend to express the consumers intentions rather than their actual actions. Finally, is might also difficult for consumers to realise what factors are involved in their valuation of goods. Valuing environmental impacts of the product is also affected by the attention it gets from the media, from political awareness and from other actors. Increased public awareness tends to place issues higher in the consciousness of consumers – in this case, the high awareness on environmental issues is in favour of a new label. However, a new *quality* will still compete with many other *qualities*. Because even though environmental issues are high on the agenda both political and at the consumer level, the experience of taste, smell and consistency might very well be more important for the consumers. The same goes for other

aspects such as animal welfare, organic production and so on. And, as previously mentioned, these *qualities* do not necessarily provide the most environmentally sustainable product.

Price is a parameter that is always valued. Will I pay this price to get this good with these *qualities*? The representative from Dagrofa (2019) clearly confirms how the retail corporations experience that price is an important *quality*: *"There is no doubt about that price plays a big part. It is all about whether the consumers think that they get a certain quality for the price of the good"* also hinting the constant trade-offs that occur during the choice of products in the minds of consumers.

While it is important to highlight that price might be important, it is definitely not the only valued *quality*. The sheer amount of different labels is a clear testament to this, since their existence would not continue if they were not being used. If price is the only *quality* of interest for the consumers, we would not have the labels we have today. Furthermore, we would not have the different options of similar products that we have today. Thus, while the price is an important factor we are not at a neoclassical state, where consumers only value economic price.

Cochoy (2007) suggests that the social networks we are a part of also play a major role when we have to choose one product over another. For example, in a family the children and parents might have different priorities and wishes for their products leading to differences in their valuation. There is also an effect of media and influences from specialists. When certain news about bad chemicals in our food or specific food types are bad for the environment, it can affect the product choices of the consumers. In turn, this might lead the consumer to overvalue some and ignore other of the *qualities* provided in the arrangements of the supermarket. In the case of palm oil, similar trends were observed when the consumers started to gather in social groups sharing common concerns. Similarly, when the media and experts proclaim that meat is a devastating source of greenhouse gasses, we see a rise in the number of vegetarians. Such decisions are not affected by *qualities* stated on product in the supermarket but is caused by mindset of the consumer before they enter the supermarket. Some consumers are very determined in their shopping approach, others are more easily affected by what is offered on the shelves of the supermarket and their opinions are more flexible.

The priorities and perceptions of the consumers are critical determinants of which *qualities* are deemed most important. If the price is low, the aesthetics or *quality* of the product may be less important. As there are so many different and potentially conflicting wishes and demands from the consumers, it can be difficult to create a *quality* that will affect a broad group of consumers.

It all comes down to which *quality* will win the struggle for what is of most value to the consumer. Is it the environment, their health or the social class they want to belong? And are their values strong enough to resist the other influences they may encounter at the point of purchase in the supermarket?

The retail corporations

The supermarket has one primary function: to sell products in exchange for money. Thus, the supermarket agencies also choose to offer the products that they assume the consumers want to buy. The retail corporations also use the *qualities* provided by manufactures to value if the specific goods is suitable for the shelves in their supermarket (Coop, 2019; Dagrofa, 2019). If they experience the consumers asking for more products with specific *qualities*, the supermarket agencies will request these *qualities* from the

manufacture and distributers. Thus, for supermarkets to use their influence to promote environmental sustainability there must be a demand for sustainable products. If only a minor part of their customers request environmentally sustainable products, it is unlikely to be worth it for the supermarkets to make large changes in their selection or framing of products. As stated by the Coop representative (2019) regarding the use of the retail corporations influence to make customers buy less meat: *"[...] we do not believe that the consumers will simply cut off all meat consumption from one day to another. That is why we should not make initiatives that give them bad conscious when they are shopping in our stores – because then we just risk that they will go somewhere else."*. Thus, for retail corporations to affect and change the customer behaviour, the change has to be done in small steps. Finally, it is important to keep in mind that the retail corporations can have many functions and roles, but their most important role is to sell the products in demand.

Even though it may seem as if the retail corporation regimes are dominated by the consumers demand, both of the interviewed representatives expressed concern for the environment and explained how their respective corporations had responsibility and sustainability as core elements in their corporate strategies (Coop, 2019; Dagrofa, 2019). Such corporate responsibility is also exemplified by Coop when they find a need for creating a more demanding label for animal welfare than the one proposed by the Danish Veterinary and Food Administration (Coop, 2019).

Other agencies within the supply chain

The other agencies in the supply chain such as the agricultural workers or the processing plant can also provide values to the goods. For instance, at the agricultural stage it is decided whether the produced meat should be organic and whether their final product should fulfil the criteria for an animal welfare label. The agricultural stage also has high influence on the environmental *qualities* as most of the impact will occur during agricultural production. Consequently, the agricultural stage is likely to be the most important provider of the information required for an environmental label.

Even though not in direct connection with the consumer, the farmer at the agricultural stage thinks about how he wants the consumers to value his goods. For instance, when he decides to use antibiotic as treatment or ensure animal welfare, he invests the additional expenses these choices may have in the belief that it will make the goods more appealing to the consumers. These actions are the qualification and determine what the consumer can base their purchasing decision on.

Agencies outside the supply chain

Outside the chain we have agencies such as governmental institutions that also define the goods though regulations. These regulations include rules regarding transportation of animals, handling of meat, legal additives etc. By providing guidelines or issuing concerns, NGOs and branch organization also have the potential to define and add value to the goods. Finally, the media has great influence on how they present potential scandals, concerns and new innovations, which may greatly impact the valuation of goods.

Singularization of goods and equipping agencies

In order for consumers to be able to choose which product they want; they need to be able to compare and evaluate the available products. This is one of the key interests and aspects of markets and how they form and develop – what is being offered to the consumers and how does one good differ from another. This aspect is of great interest for the agencies that seek to develop and manufacture new products as it show

how a product can be different from those already in the market (singularization), so market shares can be taken. Market agencies aim to minimise the gap between what the consumers want and expect and what is offered to them. The aim of singularization is to cause attachment between the consumers and a certain good and subsequent detachment from the competing goods.

The singularization is built on the *qualities* of the goods. The singularization of a product may only give rise to attachments to the consumer if the consumer can compare it with similar products.

But making the goods unique by making their *qualities* visible is not the only necessity. *Qualities* help the consumer become equipped to interpret their underlying value. However, it is important to also make sure the *qualities* are correctly understood. By being equipped and correctly interpreting a product's *qualities*, the chance of the consumer to form attachments to a product is higher. The change away from a previous attachment is referred to as detachment by Callon et al. (2002). Attachment to and detachment from products happens in the supermarket when new *qualities* comes to the attentions for the consumer. This can occur by the introduction of a new label or by the new information, for instance on a sign in the supermarket, through the media or through social networks.

The purpose of a new environmental label is to provide the consumer with a tool that equips them to value a product by new characteristics. Whether or not they will act, or in what degree they will act is uncertain and cannot be known before the label enters the market. The label should first and foremost provide the consumer with knowledge of the environmental impacts of the labelled products. The knowledge should be presented in a way that it is easily understood by the consumer. If this succeeds, the consumer is now equipped to make an informed choice on whether to buy a product with high or low impact on the environment. In addition to not being too complex, the label should not be too overwhelming regarding the amount of information it presents.

However, it is important not to neglect ability of labels to gain the attachment of consumers, even when not containing quantitative information. For example, the Nordic Swan Label does not state any quantitative values specific to the product. Nonetheless, consumers still value the presence of the label and use it as a tool in the decision-making process. Thus, labels and *qualities* do not need to directly communicate the quantitative values they represent. While the ability to change consumer behaviour without presenting information specific to the product can be valuable from at marketing perspective, but it does not equip the consumers to make informed choices. In the quest for providing the consumers with more knowledge, we should strive towards providing the consumers with the necessary information to make them understand why they should attached to the labelled good. A new environmental label should thus display tangible and quantitative information about the environmental impacts of a good. This should aid the product in singularization and foster the wish to detach from their previously preferred good.

Callon et al. (2002) state that the consumers who are attached are the consumers who are following their routines. They buy the good with the *qualities* that they are familiar with, they frequent the same shelves and know what they get. Thus, until prompted to change their decision, they are not affected by the *qualities* of other products. Creating detachment between consumers and their choice of habits is thus a big challenge to overcome. Do they even consider other goods? In order to reach the consumers attached to products that are detrimental for the environment, it would make sense to supplement a new environmental label with campaigns and advertisements that create awareness of the new tool for valuing

goods. Awareness can also be gained if a quantitative label is mandatory on all products (such as the nutrition values). If a label suddenly shows up on the good that you always buy, it will bring attention to the values this label represent and creates curiosity towards the values on other competing goods.

The *qualities* on goods make the consumers *equipped* to value the good (Çalışkan & Callon, 2010). In relation to assessing environmental impacts of products, the consumers are currently under-equipped. The consumers are unaware of what happens during the stages of the supply chain and can only attempt to guess the environmental impacts of the good. This beckons for a way to provide the consumers with the necessary tools to valuate environmental impacts – to make them better equipped.

Alternative solutions to make consumers equipped

Both retail representatives agree that the consumers appreciate labels in general, especially those labels that are well-established in the market. Labels are a valuable tool for the consumers to navigate by, when shopping in a market having many *qualities* to assess (Dagrofa, 2019; Coop, 2019). However, both representatives do not consider a label to be the best solution to make the consumers aware of the environmental impacts of food products. This opinion is shared with other agencies in the market. To map out the pros and cons presented in the current public debate, I set out to summarize the various debate contributions of market agencies in a table to get an overall idea of the arguments (Appendix 5). There is a general consensus that it is important to make the consumers equipped. However, only a few market agents such as Torben Chrintz from CONCITO and Camilla Udsen from The Danish Consumer Council were open to the idea of a climate label when presented by the Danish Climate minister: *"[...] in principle there is a gap that could be filled out by a climate label if it can be created in a way that does not mislead and confuse"* (Udsen, 2018). Other agents believe that the consumers have enough labels to consider. As stated by the representative from Dagrofa (2019): *"Maybe we should rather develop some of the existing labels than try to invent something new all the time"*. In this regard, he considers the organic label to be an obvious choice for that.

In addition to the organic label, The Nordic Swan label and EU Ecolabel are also interesting candidates to include in more product categories. They are well-established environmental labels and many consumers already know their logos. In a recent statistic, it was shown that 95 % knows about the Swan label and that 6 out of 10 Danes look for the Nordic Swan when they choose their products (Miljømærkning Danmark, 2019a). Whether the consumers also know the specific criteria behind the respective labels, is more questionable. Neither the EU Ecolabel nor the Nordic Swan are currently applicable to food products. When I contacted Ecolabelling Denmark regarding this possibility, they referred me to a feasibility study from 2011 that assessed whether to implement the EU Ecolabel on food, feed and drink products. Their findings where that *"none of the existing European food, feed and drink labels cover all the significant environmental impacts of agriculture, processing, packaging, transport and consumption adequately, nor are they based on scientific evidence regarding the best technologies for environmental protection"* (Sengstschmid et al. 2011, p. 17). Nevertheless, the conclusion of the feasibility study was to not continue with the implementation. This recommendation was based on the difficulties in measuring environmental impacts, the conflict of what to asses, the lack of support from stakeholders and consumers and finally the risk of endorsing the consumption of meat if those would be able to apply for the label, because there seem to be a general public perception that meat consumption in Europe is to high, both from in regards to environmental aspects but also health (Sengstschmid et al. 2011).

The Nordic Swan and the EU Ecolabel are examples of optional labels. To display the Swan label or EU-flower, it is required to fulfil a list of criteria, which are renewed every 4-5 years. Further, the Swan label require payment of EUR 3.000 plus tax at the time of application, a fee of at least EUR 2.000 plus tax per year and a fee of EUR 1.500 plus tax to renew the license (Miljømærkning Danmark, 2019b). The fact that manufacturers are willing to pay for these licenses underlines the utility of these popular optional labels as tools for marketing. Consequently, these labels can only be found on the products that are willing to pay for the licenses. This means that there are products in the supermarket which might be just as sustainable as those with the Swan or EU-flower label, but not willing to pay for the labels.

Multiple market agencies also propose that the resources for making the consumers better equipped is better spend on creating a set of guidelines to aid the customers in purchasing the most environmentally sustainable goods. Such guidelines would be a good place to start, but cannot stand alone: *"So give the consumers these simple and basic and in many ways very obvious advice – I think that could move something. Is it the solution? First of all, I do not think there is one solution, but I think that in short term, this is what we can have an impact with and that it will move something"* (Dagrofa, 2019). This point of view is shared: "*good advice is a point of departure, but on the long term other actions needs to be taken"* (Mørch & Oien, 2019).

However, a myriad of suggestions and advice for more sustainable purchasing is already available from a range of NGOs, retailers etc. In fact, The Danish Veterinary and Food Administration express their intentions of including environmental sustainability guidelines in their Official Dietary Recommendations and are already presenting a short guide on their webpage (Fødevarestyrelsen, 2019). This indicates that this solution is already implemented as a tool to the consumers, but has not shown great effect so far.

A third suggestion of reducing the tax on environmentally sustained products is also debated amongst market agencies. As long as the instructions from the government are clear regarding the changes in taxation, then this would be an easy solution for the retail corporations to follow. In general, the retail corporations prefer to initiate initiatives that have specific directions set by the governments. This makes it easier to navigate in this otherwise diffuse area and helps the retail companies avoid accusations of 'green washing' which can be an issue when the initiatives come from themselves (Coop 2019; Dagrofa, 2019). Unfortunately, a tax reduction shifts the valuation towards only concerning price instead of environment. As a consequence, this solution would not close the knowledge gap between nor equip the consumers to make the right decision. Furthermore, if the tax reduction is too small it would be unlikely to make a difference.

The proposed guidelines could potentially promote behaviour change. However, it will depend on how the guidelines are presented and how they intervene in the encounters between the consumers and the product. Unlike a set of guidelines displayed in the supermarket or webpage, a label and the information it conveys would follow the product. Thus, the consumer brings the information home and will be confronted by it several times: when placing the product in the refrigerator for storage, when it in the refrigerator for reaching other products and when taking it out for preparation. Thereby, the consumer interacts with the *quality* many times. I recognize that many market agencies do not find an environment label to be the best way to spend the resources. However, I believe that the benefits of a label warrant its further investigation instead of being discarded as too expensive.

4.2.3 Market encounters

Market encounters are the third element in the marketizing framework proposed by Çalışkan & Callon (2010). It is the space where the agencies meet the goods. This happens various places along the supply chain when the farmer feed the cow and the assistant in the slaughterhouse cut and pack the meat. Finally, we also have the meeting between goods and consumers. This encounter often occurs in the supermarkets. As the purpose of this thesis is to determine how the consumer can be equipped to value a good on its environmental parameters, the market encounter at the supermarket is the most important and will be the focus of this section.

Each brand of supermarkets offer products in different packaging (the products themselves are often the same). But the information presented on the packaging can vary a lot. For meat products, as well as many other food products, the meeting between product and consumer is actually a meeting between the consumer and the products packaging. This is due to many food products requiring air-tight sealing, both to prolong the shelf life of the product and for hygiene reasons. This means, that the choice of product is, to a large extent, based on how the product is perceived from its packaging and by its pricing. For products where the consumer has previous experiences, these experiences will also be a factor for the outcome of the encounter. The selection available in a particular supermarket depends on the target segment of the supermarket. In addition to the selection, signs and structure of the interior of the supermarket are important elements in framing the products and guiding the consumers in their choices. Thus, the consumers make decisions based on a number of criteria, including their personal preferences, their knowledge and what is available in the supermarket and how it is presented.

Besides being the encounter where consumers can value products by their characteristics, the market encounter in the supermarket is also where the consumers can compare products and their characteristics and *qualities* to each other. The selection of food is controlled by the retail corporations whom thus have great influence on what the consumer end up buying. Hence, the retail corporations can be the main drivers for promoting sustainable shopping. They have the power to affect both the framing of the products and the consumers selection options (Sengstschmid et al., 2011).

In addition to their influence to affect the choices of consumers, the retail corporations can also influence the manufactures. This places the retail corporations in a pivotal role for how re-framing of a good with a sustainable valuation should be carried out. Representatives from Dagrofa (2019) and Coop (2019) express how it is part of their corporate strategies to assure, that there is a continuous focus on sustainability and high product quality. It is highlighted that Coop (2019) even has their own set of criteria for some product categories. As they want to be extra careful of what they sell the consumers, these criteria exceed the requirements set by other regulations. This influence on the manufactures is dependent on the size of the retail corporation, as only large corporations have the (economical) incitements necessary to set quality demands.

Supermarkets also attempt to change customer behaviour by creating their own product series such as Levevis, Øgo, Budget, Princip (Salling group), Änglamark, Coop 365 (Coop) and Grøn Balance, First Price, Gestus (Dagrofa). The products within each series are designed to be recognized for a distinct set of criteria set by the brand, such as quality, affordability or being organic. These series help the consumers select the product that matches their focus and make it easy to go for products with known criteria. This strategic

tendency has been shown to help the supermarkets establish loyal consumers and increase their revenue (Olesen, 2016).

For a label aimed at closing the knowledge gap to be most efficient, it would need to be mandatory on all products. In the supermarket, the consumers can to choose between and compare a range of food products. If only a few products have the label it would cause confusion and potentially false assumptions regarding the products that do not have the label.

4.3 Measuring environmental sustainability – methods and categories

All the above describes and analyses the market and the dynamics between goods and agencies. In this section, I will focus on how the results of research studies of Life Cycle Assessments can help environmental impacts to be quantified and subsequently to be presented on a label.

4.3.1 The production of a food product

Divided into the steps of the supply chain, I will go through the processes and important environmental impacts occurring at each stage (*figure 10*).

Feed production

All food products are in some way derived from plants. In the case of meat, plants are the primary feed for the animals and are an important determinant of the resulting environmental impacts. There are great differences in the efficiency by which animals convert plant materials into consumable meat products. Larger animals, particularly ruminants, require great amounts of feed per kg of meat. In contrast, poultry and pigs require considerably less amounts feed during their life (Roy et al. 2009). While most do not consider plant materials to be of major environmental impact, the inefficient conversion of feed per kg of meat results in great amounts greenhouses gases such as nitrous oxide being released, which are a major contributor to global warming (Roy et al., 2009). Nitrogen exits in many fertilizers for crops, and are then exported to the atmosphere when harvested and when digested by animals. The environmental impacts of feed production are highly dependent the type of feed. Soybeans are often used as feed for non-ruminant animals, especially pork and chicken. Due to the climate requirements of soybeans, they are often produced outside Europe and thus require long-range transportation. Furthermore, soybeans rely heavily on pesticides, which have highly detrimental impacts such as freshwater ecotoxcity (Nordberg et al., 2017). Furthermore, the production of feed requires machinery, production buildings and fertiliser usage which leads to additional environmental impacts. Due to the inefficient conversion of feed, meat require vast amounts of land for feed production per kg of product. Increased demand of meat thus leads to deforestation and subsequent damages to the biodiversity.

Agricultural production

Agricultural production is considered to be the major cause of environmental impacts of meat products (Roy et al., 2009; Sengstschmid et al., 2011; Notarnicola et al., 2017). This is particularly due to the emission of methane from livestock. This emission varies depending on the provided feed for the animals. In this stage, it is worth mentioning that some production animals produce other products than just their meat. For instance, some chickens also produce eggs and some cows also produce milk. This can create large variation in the calculation of the environmental impacts per product as it is hard to distinguish how much of the environmental impact of the animal should be contributed to which resulting product. Finally, machinery and production buildings are also relevant sources for environmental impacts at this stage.

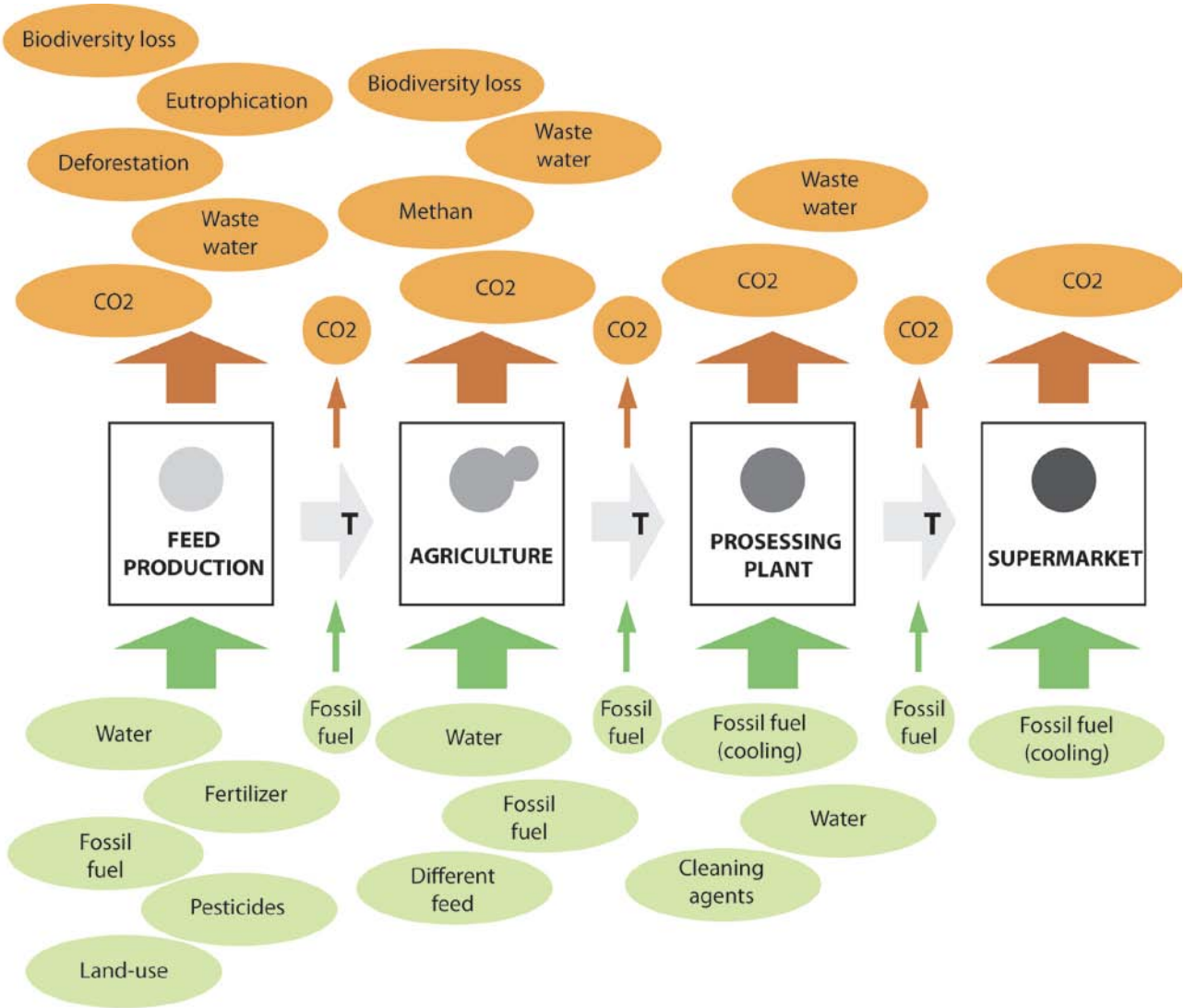

Figure 10. The different in-put and out-put during the supply chain from feed production to supermarket.

Processing plant

The stage of slaughter and processing is also recognised as a high-impact stage of meat production (Notarnicola et al., 2017). This is particularly due to the energy usage of machinery, heating of buildings and cooling systems. The use of cleaning agents with potential hazardous chemicals is also an important environmental factor as is the packaging process and packaging materials (often plastic) (Sengstschmid et al., 2011).

Supermarket

When arriving in the supermarkets, the main environmental impact to consider is the effect on climate change potential due to the energy use of cooling systems.

Transportation and packaging

Between each of the stages of the supply chain, the products often need to be moved from one place to another. This transportation emits greenhouse gasses due to the use of fossil fuel. In addition to the packaging of the finished product before reaching the supermarket, the unfinished products sometimes need to be packaged for transportation between the stages of the supply chain. This packaging also contributes to the environmental impacts of meat. Meat products are often packed in plastic materials, requiring additional use of fossil resources. Whether packaging is a benefit or burden to the environment is a debated topic. Packaging helps protect the product while being transported and while being kept in the refrigerator at the households. Packaging also has an important role in presenting the product and is thus largely responsible for the impression it makes on the consumer (Sengstschmid et al., 2011). Hence, packaging can be considered to be *quality* in itself, which can be evaluated. Additionally, the packaging displays the information about the product which is important for attracting the consumers - particularly when the product is sealed inside.

In this thesis, I focus on the choice of products made in the supermarket. This means that I will put attention to the environmental impacts of actions made after the purchase – i.e. on the consumption side. Nonetheless, it is a highly important topic as the preparation and storage of food also has environmental impacts. These impacts primarily consist of energy usage and thus have impacts on climate change. Meat is a category that also requires high amounts of energy on the consumption side as it needs to be refrigerated for storage and heated before consumption. On the consumption side, waste treatment of packaging and potential food waste can also have important impacts on the environment.

4.3.2 Lifecycle assessment

One of the main challenges of the field is to define which environmental categories to communicate. Once the categories have been decided, another challenge is to choose the best methods for calculating their environmental impacts (AU, 2019, Dagrofa, 2019; Coop, 2019). In this regard, the challenges are many. Here, I will briefly introduce the utility of the commonly used method of Life Cycle Assessments (LCAs) of food products in order to determine which environmental categories would be most relevant to include in an environmental label.

Many studies focus on the LCA methodology for examination, calculation and analysis of the environmental impacts of specific products. Lewandowska et al. (2017) state, that environmental characteristics on products are more likely to have commercial benefits and to affect sustainable development, if based on scientific research and independently verified claims based on a lifecycle approach. As such, the LCA

method and its different modifications is considered to be the primary tool for assessing the lifecycle of products. LCAs are often used as a tool for internal analysis within the company, with the aim of mapping out areas for improvements within the production (AU, 2019). The typical framework for an LCA is to *define a goal and scope* (what output parameters to analyse and the functional unit, for instance total CO_2 emission from 1 kg beef), *create the inventory analysis* (map out the life cycle and include all input and output processes), *evaluate the impact assessment* (evaluate the results), and finally *interpretation of the results* (identify significant issues and conclude on the scope in question) (Roy et el. 2009).

The amount of data acquired from an LCA is comprehensive. Hence, LCAs are usually conducted with a specific purpose in mind or on a specific functional unit. Therefore, existing LCAs can be difficult to merge and compare. The LCA method is systematic and requires comprehensive work. However, it provides valuable insight into the hidden and intangible impacts of a product, which can then be further investigated and communicated.

4.3.3 Environmental impacts categories

One of the major challenges when designing an environmental label is to determine which categories of environmental impacts to include (Borin et al., 2011). Impact on climate change the most well-known environmental impact category. However, while this category is important, it can be relevant to include additional environmental impact categories to present the consumer with a broader and more accurate picture in order for them to understand the consequences of their consumption. Environmental impacts have been divided into a myriad of different environmental categories, some of which are highly interconnected whereas others express more isolated effects on less known environmental parameters. In regard to meat consumption, the most commonly used categories are impacts on climate change, biodiversity, land use, eutrophication, acidification and ecotoxicity (*box 1*).

In a study focusing on organic compared to conventional products, Knudsen et al. (2019) highlights the significance of including more categories than just the impact on the climate. They suggest that categories such as biodiversity, ecotoxicity and soil carbon changes are also relevant areas for environmental improvements in the context of feed for cows. Both meat and dairy product has high impact on eutrophication (Tukker et al., 2006), but also emit large quantities of greenhouse gasses and are damaging to biodiversity through release of toxic chemicals and deforestation. According to Sengstschmid et al. (2011), the environmental impacts from the agriculture stage are so dominating that the rest of the processes in the life cycle of meat products can be considered as largely insignificant. This is confirmed in a study on yoghurt by González-García et al. (2013), where eight impact categories were taken into considerations and the result shows that the primary production phase is responsible for a significant proportion of the products effects on acidification (91 %), eutrophication (92 %) and global warming (62 %).

Tukker et al. (2006) also emphasize that the different categories are highly correlated for specific product grouping. For instance, if the product has a high impact on global warming, it will most likely also have high impacts on acidification and photochemical ozone formation, and to some extend on eutrophication.

Box 1: Relevant environmental impacts categories for the consumption of meat

Global warming potential (GWP) or carbon footprint: While GWP is usually measured in CO_2 equivalence (eq), it includes emission of carbon dioxide as well as methane and nitrous oxide. The latter two are the main contributors from agricultural production, particularly in meat production. Carbon dioxide is particularly released during combustion of fossil fuels as from machinery for agriculture or transportation.

Biodiversity loss: The demand for food, water and use of natural resources can results in severe loss of biodiversity leading to subsequent changes in the ecosystems. The loss of biodiversity is related to land use changes, but also to emission of chemicals or pesticides from production processes that negatively affect the natural environment of both plants and animals. Increases in temperature as a result of climate changes can also have an effect on the biodiversity.

Land use change and deforestation: Land use refers to the area of land that is used in production. This is a relevant category to consider since it affects a combination of nutrition in the soil by farming and CO_2 storage in trees or plants that are removed by deforestation. Much rainforest has been destroyed for the sake of agriculture. This has resulted in a drastic increase in the amount of atmospheric carbon.

Eutrophication: Also termed nutrient enrichment is particularly an issue in aquatic environments. Here it affects the oxygen level and results in the death of marine animals, particularly fish. Eutrophication is often the result of emission of nitrogen and phosphorous from fertilizers used in agriculture.

Acidification: Acid is released primarily from combustion processes in heating and electricity production and transportation. Acid release primarily affects the life of marine animals (such as fish) and the growth of vegetation. Additionally, ammonia emission from animals can be an important source of acidification.

Ecotoxicity: This refers to how biological or chemical factors can affect the ecosystems. For example, arsenic which exists naturally in the soil is also present in pesticides and can be toxic to the ecosystem. Other factors, such as lead and cadmium are also examples of toxic compounds that are detrimental to the life of many organisms (including humans, non-human animals and plants).

Other impact categories mentioned in the literature are abiotic depletion (resources such as fossil fuels and minerals), photochemical oxidation (also known as smog) and freshwater use. But these are rarely mentioned as major factors in meat production and consumption.

Build on the definitions by: (Mogensen et al., 2015; Püssa, 2013; Stockholm Resilience Centre, 2019; FAO,2019)

Rockström and colleagues has developed a framework they termed *the Planetary Boundaries* (Steffen et al., 2015). The planetary boundaries offer a framework for a 'safe operation space' where humanity can develop and act without causing serious and irreversible damage to our planet (Steffen et al., 2015). This scheme presents nine categories that should be considered to assure that our planet can uphold its resilience from the pressure created by human beings. These categories include climate change and

biosphere integrity which they state "*should be recognized as core planetary boundaries through which the other boundaries operate*." (Steffen et al.,2015; p.744). If the boundaries for climate change and biosphere integrity are crossed, it may have potential to cause catastrophic changes and drive our planet into a new state. The planetary boundaries are often presented as shown in *figure 11*. This figure also shown visualise the importance of climate change, biosphere integrity (such as biodiversity), land-use change (such as deforestation) and the biochemical flows of phosphorous and nitrogen.

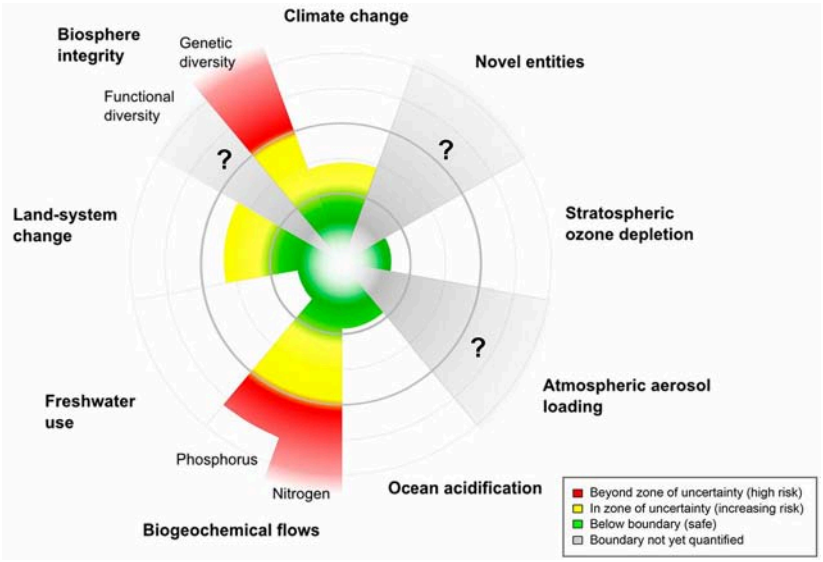

Figure 11. The model of the planetary boundaries, showing how several categories are starting to cross the boundaries. From Steffen et al.,2015.

Climate change and biodiversity as the primary focus

Which impacts categories are the most important to include and communicate in a label to affect consumer behaviour? There is no easy answer for this question, but as the researcher from AU (2019) explains: *"You can say that climate change is the most acutely burning platform, but so is biodiversity – that is really important as well. But it is in the relation to climate change, that we first can see some of the consequences that it has for human beings, if we do not act. It is one of the environmental impacts where we get it right back in our faces. Whereas some of the other environmental impacts we do not feel that much, when we put pressure on the environment"*. She later also states that *"[…] regarding biodiversity, it is challenging to put a number on. But on the other side, if we do not include it, you risk super-optimizing the systems by optimizing only for climate change and nitrogen release, then it might negatively affect the biodiversity. So, it really is a dilemma of what environmental impact categories to include"* (AU,2019). Furthermore, she hints to the four categories that she believes would be the most important to consider: nitrogen release, climate change, biodiversity and ecotoxicity (AU, 2019). The importance of these categories, particularly climate change and biodiversity are also supported by several studies (Tukker et al., 2006; González-García et al., 2013; Knudsen et al., 2019) and are included in the planetary boundaries (Steffen et al., 2015). As such, I have chosen to focus on these categories for communicating the environmental impact of meat products in an environmental label. Whereas the impact on climate change can be quantified by the release

of CO_2 equivalent units, the impact on biodiversity is harder to quantify and may need a more qualitative (descriptive) on an environmental label.

4.4 Challenges to overcome

In the previous sections, I have elucidated challenges inherent to changing the market and communicating environmental impacts of meat products. In this section, I will elaborate and discuss these challenges to highlight the important issues to consider in the conceptualisation of an environmental label.

4.4.1 Consumers mistrust in labels

Currently, the public forum is highly focused on environmental changes and especially how emission of greenhouse gasses affects our climate. Using this increased awareness to make a valuation scheme for consumers would be logical. However, it is important to make this scheme transparent and understandable to not risk scepticism and mistrust growing in consumers. If consumers do not understand or trust the label, they are likely to end up ignoring this new assessment tools and thus render it irrelevant. This also highlights the need for a strict structure in the scheme and a transparent and credible control system. In line with the fifth element of *marketization*, this is important to ensure that the scheme is up-to-date and to further develop it when new issues arise.

4.4.2 Are the consumers equipped for environmental choices?

It has been argued that the consumer cannot be expected to choose between products with different *qualities* or labels that are beneficial in different ways (Berry et al., 2008). For instance, if presented with the choice of an organic or an environmentally sustainable conventionally produced product, Berry et al. (2008) argue that the consumers might be pressured or mislead into buying the environmentally sustainable product at the potential cost of a less healthy choice. However, the consumer is already faced with trade-offs every time the buy food. By providing the consumers with more information including environmental impacts, they become equipped to make a choice that favours the environment. However, they can still choose which *qualities* are the most important for them. To make the consumers equipped and maintain their trust, we as, influential marketizing agents, must also trust the consumers to be able to make informed choices. I would argue that the urgency of changing our consumption behaviour towards a more sustainable environment is worth the risk of pressuring their choices. If we destroy our planet by refusing to change behaviour, it really does not matter if we eat healthy or save money.

4.4.3 Re-framing the market is a slow process

From being aware of concerns and acknowledging the issue to actually changing our behaviour is a big step. Change in consumer behaviour is a slow process. For instance, despite the increasing awareness regarding the benefits of organic products, that it has taken 25 years since the introduction of organic foods in the Danish markets (Dagrofa, 2019) to only reach a market share of 13.3 % (Willer & Lernoud, 2019). This also highlights that, similar to the guidelines suggested by the retail corporation representatives, an environmental label cannot stand alone to counteract the environmental crisis. Other initiatives also need to be implemented for a faster transition towards conscious consumption. For instance, introducing changes in the production processes.

4.4.4 Expensive and resource demanding

In the *Marketizing* framework Çalışkan & Callon (2010) include price-setting as essential focus. The outcome of valuation and the struggle of agencies always come down to price. In this regard, the question is whether a new environmental label will influence the price of the labelled good.

Both of the representatives from the Danish retail corporations argue that environmental labelling would require LCAs of all the products in their warehouses, which would be quite costly (Dagrofa, 2019; Coop 2019). They claiming that for each product, an LCA can easily cost 1 million DKK. LCAs can be expensive and time-consuming to conduct and it should be considered whether the cost of doing an LCA would supersede the benefits from the communication implemented and archived (Molina-Murillo & Smith, 2005). The researcher from AU(2019) also point to the resource requirements of labelling all food products: *"To do an LCA is resource demanding and not something you do lightly. It is the job for a detective to figure out where the specific food product in the refrigerated counter in the supermarket comes from, where does the fertilizer used in its production come from, where does the feed for the cow come from? You need to calculate the emersions from all the stages of the process"*. Further, she highlights that it is important to assess where and how you get the most environmental benefit for the money. This hints to the fact that despite being a costly endeavour, we do not know which impacts an environmental label would have. Instead, she points to the benefits of developing guidelines for the consumers, such as "eat less meat" and "eat the seasonal vegetables" etc. (AU, 2019). Indeed, the introduction of easy guidelines has been suggested by many marketizing agencies participating in the public debate. In regard to the European Union "PEF" project, their representative did not find any reason that this label should cause an increase in price (PEF, 2019). Despite this, it is hard to imagine that implementation of a system requiring LCA or similar assessments of all products would not have an impact in the overall costs for the manufacturers and thus be reflected in the price of the final good. However, if all goods were required to carry this label, they would in theory all be affected equally and thus it would not interfere with the competition between products at the price level – only at the environmental level. Unfortunately, the price of an LCA is the same no matter how many products you produce and sell. So, in effect, the implementation may also affect competition on price as smaller manufacturers would need to increase their prices disproportionally to the larger manufacturers due to their division of the LCA cost on less product units.

4.4.5 Who should manage a new environmental label?

In line with the fifth element in the *Marketization* framework (Çalışkan & Callon, 2010), it is important to determine who would be best at managing and maintaining an environmental label and how should this be done. Promoting sustainable food consumption requires an effort from all actors in the supply chain, including governmental actors, retail corporations and the food production industry (Minter & Chrintz, 2016). Even though Coop has developed their own label about animal welfare, it would be highly unlikely to see the retail corporations implementing an environmental label (Coop, 2019). Together with several studies, the retail corporations point to the case of the British retail corporation, TESCO, as an example (Dagrofa, 2019; AU, 2019; Leach et al. 2016). In 2007, TESCO initiated a project aiming to label their 70,000 products with *carbon costs* to allow comparison of products in parallel with comparisons of price, salt content and calorie counts (Finch & Vidal, 2007). Five years later, the project was dropped due to lack of support from other supermarkets and due to the sheer amount of work included in the endeavour (Vaughan, 2012).

In a survey from 2015, CONCITO finds that 55% of the Danish consumers think that the politicians should promote actions to reduce the climate impacts of our food consumption, either by taxes, labels or information campaigns (Minter, 2015). However, the responsibility is not on the politicians alone, the consumers also have a responsibility to consume sustainably (Landbrug & Fødevarer, 2017). In fact, many experts within the field point toward the benefits of having governmental institutions managing a label and developing the scheme. This is consistent with the current PEF project developed by the European Union. Governmental organisations already manage several of the labels found in the market. Thus, the governmental organisation already has the infrastructure and great experience in the field. Consequently, it makes sense to include an environmental label in their portfolio in line with those labelling healthy, animal welfare and organic products.

If an environmental label became a governmental initiative it would also help deal with uncertainties regarding 'green washing'. In this regard, the representatives from Dagrofa (2019) and Coop (2019) point out that the risk of being accused of 'green washing' is highly demotivating for corporations to make sustainable initiatives. Consequently, they suggest that the government could help the market by promoting strict guidelines for how the retail corporations should communicate sustainability issues to the consumers. These regulations would help prevent actual 'green washing' as well as limit the accusations of 'green washing'.

4.4.6 Collection of data and system requirements

It is emphasize by several (AU, 2019; Dagrofa, 2019) that it will be challenging to collect the data required for calculating the environmental impacts of all products. Not all countries have functioning infrastructure or agricultural systems. This is likely to result in imprecise data and uncertain calculations. This is particularly likely if the product or constituents of the product are produced in developing countries (Plassmann & Edwards-Jones, 2010). If a system is established that demand all actors in the supply chain to account for their environmental impacts, it could have consequences for the living conditions of farmers and factories in developing countries (Plassmann & Edwards-Jones, 2010). It could be argued that environmental impacts should be prioritised for our planet to survive, no matter if you are rich or poor. However, it might not be possible for farmers in developing countries to being assessing the environmental impacts of their production before they have sufficient economic and social stability to support such a transition. Thus, the different pillars of sustainability are interconnected. So while we in western countries have the necessary social and economic stability to be concerned for the health of the planet, others may not be as fortunate. If environmental initiatives are forced on the developing countries it will affect their possibilities of sustainable economic and social growth.

Although it is challenging and expensive to collect the necessary data to present the environmental impacts of a product, most production facilities (including agriculture) have been efficiently optimised. Thus, much of the required data regarding: input (feed), output (total kg of meat) and utility (fertilizer, energy, etc.) consumption must already be documented. As these parameters have been shown to be the most important in the total environmental impact of meat products, they should be sufficient to give good estimates of the products impact.

Coop proclaims to have their own set of standards that exceeds the requirements from the government on several points (Coop, 2019). Thus, the retail corporations appear to have the power to demand certain

information and criteria upon their suppliers. Thus, the retail corporations could demand that their suppliers provide the information necessary to determine the environmental impact of their products. Coop already sets different criteria on the use of pesticide for their products and as such it could be relevant for them to also require proof of low CO_2 emission in their products.

In addition to the challenge of collecting the necessary data, there are additional challenges that need to be considered. For instance, weather is a major factor in most agricultural productions. Thus the environmental impact of the products would be dependent on weather (causing differences in the use of water, heating and fertilizer) at the time of production (AU, 2019). This highlight the importance of creating a system that is easy to access, understand and fulfil for all involved agencies.

Some manufacturing companies have their own methods for assessing their environmental impacts. These companies use this information in marketing and branding of their products as well as to reduce their environmental impacts. While the increased corporate conscience is a positive trend in the food production industry, the fact that the data and methods are developed by the companies themselves may cause confusion and limited credibility and comparability of their results (Plassmann & Edwards-Jones, 2010). To highlight the differences in assessment methods, Brenton et al. (2008) list 17 different methodologies for calculating a products carbon footprint. Whether the fact that the companies have begun to make these calculations, despite their different approaches, is beneficial or detrimental for the environment, is hard to evaluate. However, there is no doubt that using the same methods or system would be much better to fill the knowledge gap for environmental information.

4.4.7 The environmental categories are connected – be aware of super-optimisation

In most cases, the carbon footprint is a relevant estimate of the environmental impacts of foods. As listed in many studies, meat produces high CO_2 emission eq. per kg product (Mogensen et al., 2016). However, focusing solely on a single impact category can be dangerous. AU (2019) emphasises that, when stating that certain products have high environmental impacts based on a single or few impact categories, the risk of super-optimizing is an important aspect to consider. In this context, super-optimizing refers to the process of improving a single measured output parameter (such as CO_2 emission) by negatively affecting other parameters (such as biodiversity or land-use). If these other parameters are not included in the subsequent calculations, the product appears to be more environmentally optimized while in fact I could be much worse due to its other impacts. This is confirmed in a study by Nordborg et al. (2017), where they investigate the freshwater ecotoxicity impacts of pesticide use in six different productions. The study shows that, the minced pork and chicken fillets have higher ecotoxicity impact than minced beef. In contrast, when measuring these products in relation to CO_2 emissions or land-use, beef shows much greater impact than chicken and pork. The explanation for these differences depends on the feed commonly used for the different animals. In Sweden, where the study was conducted, chicken and pigs are often feed with soybeans produced in Brazil – a production that includes high amounts of pesticides. Regardless, all meat products appear to have a relatively high environmental impact. Thus, most guidelines would likely have to include suggestions for reducing the intake of meat products, irrespective of origin. So while it is important to include multiple impact categories to avoid super-optimization, it is important to also present the

consumer with an easily understood conclusion regarding whether the product in question is good or bad for the environment.

4.4.8 Allocation

Some productions are not limited to a single output. For instance, cows produce milk through a large proportion of its life and meat upon their slaughter (Roy et al. 2009). Thus, another challenge is to determine how the accumulated environmental impacts of the cow should be divided unto the resulting products. According to the researcher from AU (2019), this is also believed to be one of the challenges that the PEF project is struggling with.

4.4.9 Summary

From the multi-level perspective it is clear that the pressures to promote environmental initiatives are emerging from the societal landscape and affects both the regime and niche levels. The concerns from scientist, politicians and consumers create overflows and demand actions to reduce the impacts from food consumption. The consumers as well as retail corporations request more knowledge and tools to become equipped and adopt more sustainable consumption behaviour. The market is not equipped to meet these requests and from the elements of the *marketization* framework it becomes clear, that meat products need a new environmental *quality* to become pacified in the new market. Such a *quality* can be formed in many ways, but to fill the knowledge gap and equip the consumers, the *quality* should include actual environmental data and not simply mark the "best" products. The *quality* should be visible and easily understood in order to detach the consumers from their old buying habits and allow their transition into more environmentally sustainable behaviour. There are many challenges that need to be overcome to create a successful *quality*. Food consumption is highly influenced by habits and potentially wrong consumer perceptions regarding the products they buy. Environmental data can be hard for the consumer to interpret but needs to be easily understood. Environmental impact can be expressed by many impact categories. Most studies suggest that *climate change, biodiversity loss and land-use* as wells as *eutrophication* are the most significant in regard to meat production.

5. CONCEPTUALIZATION AND PROPOSED SOLUTION

5.1 Making the invisible visible: Developing an environmental label

The purpose of introducing an environmental label on food products is to reduce the impact our consumption has on the environment. The aim of the label is to equip the consumer with sufficient information and knowledge about the impact of a given product to compare and decide on a sustainable choice without compromising their other requests for a product. To conceptualise and develop a draft for such a label, three elements need to be discussed: What to communicate, How to communicate it and Who should communicate it.

5.1.1 What to communicate: Ideas for the content

The three most important impact categories for meat products are: *climate change, biodiversity loss and land-use* as wells as *eutrophication*. Displaying all three categories on a label would reduce the risk of super-optimization and equip the consumer to understand more than just the carbon footprint of products. While harder to understand than a single number, three categories are unlikely to be too overwhelming for most consumers and thus be a good compromise in the balance between simplification and information-overload. However, impacts on climate change are of the highest urgency and should not be neglected. To facilitate this, the different categories can be displayed with different emphasis.

Biodiversity and eutrophication do not have easily interpretable quantifications and thus become more challenging to communicate than the than impacts on climate change which is often expressed as kg CO_2 eq. To get around this, the label could include pictograms or small descriptive text, that explain the impacts these impact categories. Alternatively, focus could be directed on the major contributors to these impacts and include the amounts of pesticides and fertilizers used in the production.

To make it easier for the consumers to understand the impacts on biodiversity and eutrophication, the label would greatly benefit by being accompanied with a set of guidelines as has been suggested by several pivotal marketizing agencies. This would thus be more educational than mere facts and should be carefully communicated in order not to risk consumers becoming defiant if seen as instructions rather than suggestions.

5.1.2 How to communicate: What catches the consumers attention

The label should be placed on the packaging. It should be considered whether regulations should require it to be displayed on the front. Examples of previously studied or tested environmental labels can generally be divided into three types with different levels of information:

1. A simple logo without any text or quantifications (similar to the Organic and the Nordic Swan labels). To get these labels the product has to fulfil a set of criteria, but the precise criteria are not known by common consumer.

2. A label that include a scale of some kind, such as two of the animal welfare labels. These labels also have requirements, but depending on the criteria the product fulfils, it will be placed accordingly on the scale.
3. A label, or more specifically a declaration, similar to the nutrition declaration. For these labels there are no hidden criteria that need to be fulfilled as all information is presented in the label.

For an environmental label with multiple impact categories, using both text and a pictogram could be helpful to explain the content and ensure complete understanding. A general symbol that indicate, that the label concerns the environment will assist easy identification by the concerned consumers and help catch their eye. If the label presents too much information, the label will become too different from product to product. Thus, a logo would help the consumer find the comparable information when encountered with the choice between two products.

Several studies suggest that colour coded scales are favoured by the consumers. These scales make it easy to understand quantitative information as it is instantly visible if the value is considered high, medium or low. Traditionally, red-yellow-green "traffic-light" scales have been used. However, these only allow the presentation of three levels. More levels can be included by using intermediary colours, as long as it is evident where on the scale the colours belong.

5.1.3 Who should communicate: The system behind

Most studies and involved agencies suggest that labels are best introduced and managed by governmental organisations. Studies also show that consumers find governmentally managed labels more credible than the third-party labels. Alternatively, labels can be managed by larger unions such as the EU as this would allow all products within the union to use this label. Labels displaying environmental impacts should be mandatory to make sure that even the most detrimental products actually show their environmental impacts. If not, the label will only be used on the products with low environmental impacts. By managing the label at the governmental level, it ensures a coherent methodology which is more credible to the consumers. It should be controlled by a third party.

The environmental data required by the label should be provided by the last step of the products supply chain before the product is packaged and presented for the consumer. This ensures that all data from the previous stages can be included in the label.

The PEF project is an interesting idea, but very resource demanding, particularly as they are including all product categories already from its initiation. By narrowing the category to only include food products it could increase the labels chance of success. Once established, other categories could be more easily implemented by using the experiences gained from the initial project. No matter what type of label is chosen, it requires a clear and transparent set of criteria for how the data should be collected how to calculate the impacts of the product. Alternatively, the system could be designed so that only certified consultancy bureaus would be allowed to perform the utilized LCAs. This would assure consistency in the calculations, but also drastically increase the cost of the label – and thus meet more resistance from the manufacturers. It would be relevant to make some kind of online platform for the data to be submitted and provide the values to include in the label. Proposals in the PEF project have also included QR codes. This would make it possible for the consumers to find additional information regarding the impacts of the

products that are not displayed on their label. If the data is collected any way, this an intriguing idea for the most concerned and curious consumers.

5.1.4 Label sketches

Different design and brainstorming sketches on an environmental label have been developed along this project. The major challenges for the design have been to make sure enough information is included, while still being easily interpreted by the consumer.

In the next section, I will highlight some of the final sketches. Additional sketches can be found in appendix 7.

5.2 Proposed solution

In *figure 12* shows the proposed environmental label. The label consists of a scale solution with four levels build on the emission of kg $CO_{2\ eq}$/kg product. For the included example, the numbers are based on the table provided by Mogensen et al. (2016). The levels indicate the ranges of 0.0-1.0, 1.1-3.0, 3.1-10.0 and above 10.0 kg $CO_{2\ eq}$/kg product. This scale is set for the purpose of the examples and to make the scales most meaningful, the actual scale should be determined by experts and based on a larger dataset of values.

The highlighted number together with its placement and the colour-code will make it easy for the consumer to evaluate the CO_2 emission of the product.

In addition to the CO_2 emission, there is a concise text providing facts about the other environmental impacts of the product, particularly concerning biodiversity and eutrophication. This focus of this text can vary from product to product depending on what is deemed most important. As explained by the expert from Aarhus University, precautions should be taken by not only focusing on one or a few impact categories as this will risk the neglecting others.

Additional calculation methods or data collection systems as well as other impact categories can be implemented in an expansion of the label if found to be appropriate. However, until the consumers are used to the label, it would be best to keep it as simple as possible.

Many impact categories are not easily quantitated. Terms such as biodiversity and eutrophication should be implemented using more familiar terms for the consumer to understand and relate to.

To some degree this it would be beneficial to combine the proposed label with a list of good and simple guidelines. However, it is important to emphasise that these guidelines or advice should also be presented on the packaging. It is also important to keep the information on the label objective and stick to the facts of its environmental impact. Furthermore, no statements or advice should dictate the behaviour by using terms such as “should do”, “suggested to” or “need to”, as such statements would be likely to alienate the consumers and their behaviour, which could result in negative effects.

Figure 12. The proposed label design. Scales are assisting the number for CO_2 emission, thus making it easy to understand as well as informative

It should be a mandatory scheme to ensure every product can be valued and the consumer to have the possibility to be informed and to do conscious consumption. Further it would align so all products no matter which supermarket (also online supermarket) they are bought in can be compared, opening for possibilities to also assess the private labels proposed by the different supermarkets.

It is important to further combine this label with other initiatives such as improvements for reduced impacts during the agricultural production. The label should help and encourage these actions. Furthermore, when the label is launched it is important to make the customers aware of its existence. This could be done by advertisements and campaigns on relevant websites, on social media as well as in the supermarkets.

5.3 What is next?

Many studies have abstained from suggesting labels as an obvious solution to the high environmental impact of consumption. While some labels have been tested in minor pilot studies, the results have often been based on surveys and focus-groups based on the opinion of consumers of the label or simulations with very limited selection of food products – and not a direct measurement of its potential effect. Many of the tested labels only conveyed information about a single impact category (most often CO_2 emission). In order to test the actual effect of an environmental label, it is necessary to make real pilot initiatives in real supermarkets. Laws and regulations could make this difficult, but exceptions should be made by the governments if they want to reduce the environmental impact of consumption. While consumers could be informed when they enter the supermarket, this knowledge that they participated in a test might alter their choice and thus the results of the test.

But before testing the label it is important that the design and content is clear and understandable for the consumers. Thus, the next step will be to get feedback from the consumers, of whether they understand the information and the label in general. During such surveys, the consumers could also comment on whether they believe that a label would make a different in their purchasing habits. However, these answers should be considered as secondary or tertiary goals and should not determine the success of the test.

More importantly, experts within the field get a chance to comment and provide suggestions for improvements. Due to the apparent resistance towards a label by many experts in the field, some might dismiss it, but some could be open for the idea, at least enough to test and further develop the concept.

If implemented in the market, it would be critical to follow the consumption of different food products through sale statistics to determine if more products with low environmental impacts are sold after the implementation of the label. For these statistics to have merit, a thorough baseline of sales statistics before introduction of the label would need to be collected. Due to the high awareness on the issue, the baseline should be made right before the label is introduced to limit the effect of other influences.

6. DISCUSSION

6.1 Does a label have a chance in the market?

It is often heard, that our products are drowning in labels. Thus, it could be counterproductive to implement additional labels which could cause more confusion instead of clarity for the consumers. However, there should be a balance in the amount of labels that present different *qualities* to help the consumers make a balanced and complete assessment of the products (Koos, 2011). The fact is that no strict environmental *qualities* are implemented in the current market, suggests that a niche is vacant for a new label. Particularly in light of the increased awareness of environmental issues causing concerns in our society. To counteract the large amount of labels already on products, it is important to continuously evaluate of the relevance and effect of existing labels and remove irrelevant or ineffective labels from the market. This will assure that the consumers continue to find labels relevant in their market encounters and make room for new labels without flooding the packaging.

It has been proposed that instead of introducing a new environmental label, environmental impacts should be included in one of the existing labels, such as the organic label. The benefit of this approach would be to put pressure on the manufactures that currently produce organic products but may not fulfil the criteria for environmental impacts. However, by including additional criteria in an established label, it would be highly likely to pass by unnoticed by the consumers and thus not affect their consumption behaviour. It could be argued that whether the consumer is aware or not is unimportant, if the label assured that only an environmentally sustainable selection would be available. However, in the absence of concrete environmental data, and if the consumers are unaware, the label would not help educate or equip the consumers to make environmentally conscious choices - also in other aspects of their lives.

Another point is whether environmental awareness (facilitated and equipped by an environmental label) can compete with the established *qualities* of taste, quality or price - which are often valued higher than sustainability (Minter et al., 2017). However, many surveys find that the consumers are concerned for the environment and want to behave more environmentally sustainable from consumers. It is also encouraging that other products with other environmental labels such as the Nordic Swan label are increasingly population, although the criteria and product categories for these labels differ (Miljømærkning Danmark, 2019a).

6.2 The best way to communicate

It has been argued that using the same scale on all products would be counterproductive and make the label irrelevant for comparison of similar products (AU, 2019; Coop, 2019). For instance, if comparing two kinds of milk the scale on the two labels would look very similar. A label that divides the products into a discrete scale would clearly indicate that all meat have high and all vegetables have low environmental impact. This will provide a very simplistic picture and not show the relatively big differences between products placed in the same scale level such as rice (3,3 kg $CO_{2\ eq}$/kg product) and pasta (1,4 kg $CO_{2\ eq}$/kg

product) or yellow cheese (9,6 kg $CO_{2\,eq}$/kg product) and cottage cheese (3,5 kg $CO_{2\,eq}$/kg product). To make such comparisons possible, the proposed label uses a discrete scale together with the actual values of their CO_2 emission.

It can also be argued that scales can affect customer behaviour differently than intended. For instance the consumers may conclude that chicken has lower environmental impact than beef and thus continue their daily consumption of meat just switching from beef to chicken. While this will reduce their overall environmental impact, it may also reduce the number of consumers completely cutting meat from their diet, which would have a much greater impact on the environment. To avoid this, the environmental label could be assisted by additional initiatives that inform the consumer of the benefits of choosing alternatives to meat and dairy products for instance through easily understandable guidelines.

6.3 Are the money well spent?

One of the major points of critique regarding the implementation of environmental labels by the involved actors have been the expected price of implementation. Most suggested labels have been based on data collected from LCAs, which are extremely costly if scaled to be used on all products. It is suggested by market experts that these resources are much better spent on other initiatives – although these may be less effective. While cost is a major challenge for the implementation of environmental labels, I believe that we cannot discard the idea without looking for alternative approaches to acquire the necessary environmental data. Judging from the data included in several studies, it is possible and much cheaper to initially identify the processes involved in the production of a product with the highest impact on the environment. As one or a few processes are likely to be dominating, the remaining processes would be neglectable by comparison. Reducing the assessment of environmental impacts to one or a few processes would drastically reduce its cost while still giving reliable estimates of the true value. Alternatively, as is the case for many other fields, the emergence of powerful machine learning algorithms may make it possible to get highly accurate estimates for environmental impact without conducting actual LCAs. This would still require some LCAs to be conduction in order to train the algorithms but it would make the method much more scalable to involve all products within various categories without greatly increasing its cost.

Finally, the price of the LCAs should be held up against the price and expected impact of other initiatives such as tax differentiation, nudging or even more radical systematic changes such as removing the most environmentally detrimental products from the supermarket.

6.4 A step in the right direction

Callon et al. (2002) use the term *Hybrid Forums* to describe a space for debating the functions of particular markets. This thesis is my contribution to the *hybrid forum* of environmental labelling and communication in the market of food consumption. In this thesis, I have combined researchers, agents from retail corporations, research papers and grey matter publications. I elucidate the potential challenges as well as current and past discussions on the subject. Thus, this thesis does not look at environmental labelling and

communication from a distance, but actively participate in this *hybrid forum* in a common quest for affecting the market for food consumption towards a more environmental conscious direction.

This thesis has its inherent limitations in available time and resources. Thus, it can only be considered a step in the direction of communicating environmental impacts for education and making consumers more able to make conscious food choices. However, it is aim and hope that the epistemic work conducted here can be a valuable contribution to the further work on the subject. It is essential to invest in methods and research in order to promote sustainable transitions. Epistemic work, such as this thesis, is crucial to close the knowledge gap between consumers and the goods they buy regarding their environmental impacts.

7. CONCLUSION

The production and consumption of food are some of the largest contributors to global environmental change. Due to the exponential growth of the human population, this contribution is only expected to rise if we do not change our consumption behaviour. The results of climate change are beginning to become evident, even to the common consumers. This has drastically increased the awareness and concern of the consumers regarding the impact of our consumption on the environment. In this thesis, I have investigated the challenges and possibilities of an environmental *quality* aiming to make consumers choose more environmentally sustainable products. Based on the *multi-level perspective* framework and *marketization* theory, I have described the impacts of the increased concern of the consumers and the pressures this has caused to the market of food products. The consumers are ready to change their consumption behaviour but lack the necessary knowledge and tools. This knowledge gap and unmet need has left the market in an unstable state poised for re-framing. Introduction of a new *quality* on food products describing their environmental impacts may help render the consumers better equipped to compare products by their environmental merits and thus re-frame the market.

However, for an environmental *quality* to be effective, it needs to present the most relevant environmental impacts to the consumer while still being easy to understand. Based on existing studies and new empirical data, I suggest that the environmental impact categories necessary and most important to display on food products are: *climate change*, *biodiversity loss and land use* as well as *eutrophication*. These categories cover most of the environmental impacts related to agriculture, which is responsible for the majority of our food production.

Changing consumer behaviour in regard to their food consumption is not an easy task and includes a series of challenges that needs to be overcome. Most consumers are highly attached to their food consumption habits. To detach the consumers from their habits, an environmental *quality* needs to be visible and convincing. The lack of easy-to-understand information regarding the environmental impact of food products has caused consumers to make their own, sometimes false, assumptions regarding what is the most sustainable choice. This knowledge gap has also been exploited by manufacturers and has resulted in a general mistrust in environmental labelling. In addition, there are economical and technical challenges that need to be overcome. Determining the environmental impacts of individual products are complex and costly, especially if required for all products. Managing the data and assuring correct information requires comprehensive control systems and infrastructure to be established. Furthermore, how can the credibility of the *quality* be assured to uphold the trust of the consumers?

To best overcome these challenges, I propose that an environmental *quality* should contain actual data on environmental impacts presented in an easily interpretable way. The *quality* should be introduced and managed by an organization with authority, such as the government or the European Union to assure credibility and the necessary control systems. The environmental impact of individual products needs to be standardized but could rely on credible estimates rather than precise calculations to reduce cost. Finally, I present a design sketch of how an environmental label, fulfilling most of the described criteria, could look. So, while this thesis does not solve the impending environmental crisis, I hope that the epistemic work presented here can be a valuable contribution to the future work on the subject.

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LIST OF APPENDICES