Forces Underlying Business' Sustainability Transitions in The Food Industry

Author: Pieter Gerrits
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT

This thesis focuses on understanding the driving forces and barriers behind sustainable transitions in large supermarkets in the Netherlands. The research explores the field theory proposed by Kurt Lewin, which analyzes the behavior of incumbent actors in an industry. The study aims to fill the existing research gap by investigating the forces that influence sustainable transitions in the food retail sector. The main research question addressed in this thesis is: 'What are the driving forces and barriers behind sustainable transitions in the large supermarkets in the Netherlands?' The employed methodology involves a qualitative approach, with data collected through semi-structured interviews. Eight experts from the supermarket industry with experience regarding sustainability were interviewed, and the data was analyzed using deductive and inductive coding techniques. The results of the study highlight various driving forces; competitors, consumer behavior, cooperation, economic motivation, environmental benefits, external motivators, government, internal communication, internal motivation, market type and technology. On the other hand, barriers include (again) consumer behavior and government, economic worth of sustainability investment, infrastructure, organizational change, people, price of sustainability, research and suppliers. Public opinion is seen as either a driving force or a barrier, as this is closely related to consumer behavior. Understanding these forces is important for supermarkets to develop effective sustainability strategies. This study supports involved stakeholders by giving a clear overview and insights of forces active in the industry, which can ultimately help them becoming more sustainable.

Graduation Committee members:

Dr. Barbara Kump
Dr. Martin Stienstra

Keywords

Sustainability transitions, driving forces, barriers, field theory, supermarkets, Netherlands.

1. INTRODUCTION

1.1 Topic

Climate change is happening, and sustainability problems are arising and growing (IPCC, 2022). Therefore, environmental well-behavior is crucial in confronting these problems (Skeirytė et al., 2022). The importance of sustainability as well as the transition towards more sustainable practices have consequently gained more popularity in recent years (Markard et al., 2012).

This also holds true for the food industry. The magnitude of the food industry is unparalleled as it provides the required nutrients for people to live healthy (Miller et al., 2023). Revenue in the food market amounts to US$9.43tn in 2023, with an expected annual growth rate of 6.21% (Statista, z.d.).

Nonetheless, this industry also faces numerous sustainability challenges that form a threat to its long-term viability, like the use of resources, greenhouse gas emissions, and loss of biodiversity (Vermeulen et al., 2012). Combine this with a shift in consumer behavior regarding eco-friendly products (Laroche et al., 2001), next to an increased sense of responsibility for climate-friendly actions across younger generations (Gomes et al., 2023), and it can be concluded that this industry is also bound to make sustainability transitions.

However, making a transition in a large, stable industry like the food industry is not self-evident. It involves many factors including differences in stakeholder interests, which can slow down or hinder this change (Geels, 2014).

This thesis describes these underlying forces that players in the food industry are dealing with, specifically regarding the food retailers. Since the definition 'food retailers' is still broad, this research is focused on large supermarkets in the Netherlands.

The supermarket segment in the Netherlands includes 6.390 supermarkets (CBS, 2022). According to research agency NielsenIQ, Albert Heijn has a 37% market share, Superuni (including Plus, Coop and others) 26,1%, Jumbo 21%, Lidl 10,1% and Aldi 5,4%. Financially, the supermarkets are doing well. The revenue created by the supermarkets increased with 7,9% in 2022 to over 46 billion euros. (Centraal Bureau voor de Statistiek, 2023).

Additionally, Lewin's field theory (Kump, 2023) can be used to analyze the behavior of the incumbent actors in an industry. The field theory is an important social and organizational change theory, developed by Kurt Lewin, who was a German American psychologist in the 1940s (Huarng & Mas-Tur, 2016).

At the core of this theory is the "field". According to Kump (2023), this refers to the totality of coexisting facts at a given point in time. Subsequently, human behavior is a function of the field at a given time. The article also states that different field forces can influence behavior; field forces can be intrinsic or extrinsic motivators or drivers of behavior.

This study attempts to fill the current research gap that exists when it comes to understanding all involved factors and drivers for sustainable transitions regarding supermarkets in the Netherlands. Furthermore, it investigates how behavior of incumbent actors in this industry is impacted and influenced by field forces, according to Lewin's Field Theory (Kump, 2023). The influence and development of consumer behavior on the supermarket industry has been researched in numerous studies (Naidoo & Gasparatos, 2023; Oliveira-Castro, 2003), but does not include other involved stakeholders that also impact sustainability transitions. Thus, this research provides a clear overview on multiple factors (either driving forces or barriers) that influence the sustainable transition the supermarket industry is bound to make. This examination has yet to be explored in literature, rendering this study valuable for individuals looking for an enhanced understanding and inclusive summary.

1.2 Research Question

Therefore, the main research question that will be answered in this thesis is:

'What are the driving forces and barriers behind sustainable transitions in the large supermarkets in the Netherlands?'

1.3 Theoretical & Practical Implications

This study contributes to the existing body of literature on sustainability transitions in the food industry by analyzing the forces that either drive or form barriers to these practices. Furthermore, the use of Lewin's Field Theory (Kump, 2023) delivers a theoretical perspective that provides new insights.

The study can be used by firms to identify the key forces that impact their sustainability strategies and behavior in the industry. Stakeholders such as policymakers can use these findings to develop more effective sustainability policies that helps to make the transition easier (Chen et al., 2023).

1.4 Structure

The structure of the thesis is as follows: after the explanation of current theories on the subject as well as an elaboration of certain topics introduced in the introduction (Chapter 2), the methodology of the research is described in Chapter 3. Then follows the results of the research (Chapter 4), which is afterwards discussed in Chapter 5. In Chapter 6, the conclusion is written, while Chapter 7 consists of references and Chapter 8 includes the appendix.

2. THEORETICAL FRAMEWORK

2.1 Literature Review

2.1.1 Challenges Facing the Food Industry

Climate change is a global problem. Human activities, particularly the burning of fossil fuels, have caused a 1.0°C rise in global temperature above pre-industrial levels. Some consequences of this are rising sea levels, an increase in ocean temperature (combined with a lower ocean oxygen level), decreasing biodiversity or species loss, and other major impacts on nature and people like more extreme weather effects such as droughts, heat waves, and heavy precipitation. Climate change causes an increase in frequency and intensity of these events. Furthermore, it is expected with high confidence that global warming is to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (IPCC, 2022).

Regarding the food industry, it is calculated that "food systems contribute 19%–29% of global anthropogenic greenhouse gas (GHG) emissions, releasing 9,800–16,900 megatons of carbon dioxide equivalent (MtCO2e) in 2008" (Vermeulen et al., 2012).

Other challenges in the industry are the management of both water- and food waste. Water management is critical for companies in the food industry (especially in the meat industry (Bustillo-Lecompte & Mehrvar, 2015)) to achieve sustainable growth and improved corporate social performance, as water usage has potential negative impacts on the environment and local communities (Weber & Saunders-Hogberg, 2018). Food waste is another important factor that should be reduced, since it has both environmental and economic consequences (Reutter et al., 2017). Therefore, proper management is needed to tackle this challenge (Despoudi et al., 2021).

To place a greater emphasis on the supermarket sector: another source of waste is (plastic) packaging waste. Supermarkets heavily rely on plastic packaging for their products since plastic packaging preserves the quality and safety of food, by increasing

its shelf-life, and therefore reducing food waste. However, plastic recycling is difficult (Rossi & Bianchini, 2022), and it is estimated that at least 5.25 trillion particles weighing 268,940 tons are floating in the world's oceans (Chaturvedi et al., 2020).

Thus, food systems heavily impact climate change, but climate change in turn also impacts food systems. Vermeulen et al. (2012) describes these impacts. Crop yields, livestock, fisheries, food safety (specifically changes in mycotoxins levels), and the availability of water and land are examples of pre-production factors that are negatively influenced by climate change and can impact food supply in the supermarkets. Not only does global warming impact yields, it also affects food quality. A meta-analysis of 228 experiments found that increased CO2 levels reduced the protein concentration of wheat, barley, rice, and potato by 10%-15% (Taub et al., 2008).

Postproduction activities such as storage, food processing, transportation, retail, and consumption are also impacted. Information on this is still limited, but the understanding of how increasing climate variability (both short- and long-term) affects many stages of storage, primary and secondary processing, transport, retail, and consumption is emerging.

Extreme weather conditions can cause post-harvest losses as high as 80% for rice in Vietnam, and 50% for fresh vegetables in Indonesia (Parfitt et al., 2010). Therefore, harvest scheduling is crucial to avoid wet or hot spells that can reduce yields, causing significant economic losses (Everingham & Reason, 2011).

Furthermore, food storage infrastructure is also vulnerable to extreme weather events. Increasing temperatures lead to strains on electricity grids, air conditioning, and refrigeration, which leads to increasing storage costs (*Climate Change and Food Security: A Framework Document - World*, 2008). Higher temperatures also affect the perishability and safety of fresh food, since bacterial growth rates approximately double with every 10°C rise in temperature above 10 degrees, below that, storage life halved for each 2-3°C rise in temperature (James & James, 2010).

As far as transportation goes, the impacts of climate change are mostly region specific, but can affect the infrastructure of transportation (roads that depend on permafrost, sea and river routes, etc). It can also form threats to the distribution of food in rural areas (Ingram, 2011), particularly in low-income countries (*Climate Change and Food Security: A Framework Document - World*, 2008).

To summarize the challenges facing the industry regarding climate change, "the principal concern for food systems under climate change is their reduced capacity to assure food security to poor populations vulnerable to hunger and malnutrition" (Vermeulen, Aggarwal, et al., 2012). Climate change affects all four components of food security: availability, access, utilization, and stability over time (Schmidhuber & Tubiello, 2007; Ziervogel & Ericksen, 2010), to which poor people are more sensitive and vulnerable to (Skoufias et al., 2011). One can suggest that the effects described will also be felt by supermarkets.

These described challenges are relatively general. More specific, supermarket related challenges will be described and analyzed further up in this study, although many of these difficulties indirectly affect the end result; namely the presence of the product in the supermarket, which can be seen as the final stage of the chain.

2.1.2 Previous Research on Sustainable Practices

'Sustainable practices' is a broad term that can include multiple ideas. This subsection will explore several practices outlined in academic research that are closely associated with the supermarket industry.

Long et al. (2018) defines critical success factors for implementing a sustainable business model in the food industry in the Netherlands, which is relevant for supermarkets as well. It reveals that collaboration, a clear narrative and vision, continual innovation, a sustainable foundation, profitability, and unanticipated external events are identified as critical success factors, while barriers include external events, principle-agent issues, and a lack of support from wider actors and systems.

A way to reduce transportation emissions is by integrating local food retailing in the supermarkets. The research Zwart & Wertheim-Heck (2021) conducted states that supermarkets have the potential to increase the availability and accessibility of local food. However, challenges related to supply chain management, communication, and consumer demand will be faced. Also, "Conventional and local retailing practices are motivated by corporate sustainability strategies. Local retailing is predominantly motivated by social-economic sustainability considerations, whereas the environmental sustainability of local food is implicitly assumed" (Zwart & Wertheim-Heck, 2021). Furthermore, the effectiveness of local food retailing is not a given for meeting corporate environmental sustainability objectives. The absence of a centralized policy arises conflicts between store managers' regional context and their corporate retailing practices.

Food waste is another point of focus, since it results in both environmental and economic consequences (Reutter et al., 2017). A study by Cakar (2022) found that 60% of fresh fruit and vegetable waste can be prevented through redistribution, using data from 97 stores in Istanbul. Using life cycle assessment, the environmental effects that were avoided through this intervention were found to be $375.1*10^3$ CO_2-eq, $209.5*10^3$ m^3 water, $135.8*10^4$ MJ. The prevented economic impact was at a minimum of 1.42 million Turkish Liras (worth US $186,817 in 2020).

To confront the problem of plastic packaging waste, Arun et al. (2021) did research on tackling environmental pollution by using agro-waste (coconut shells) to synthesize cellulose nanofibers. After several processes, the resulting PVA-CNF-oil composite film showed good antioxidant and antimicrobial properties against food-borne pathogens, superior mechanical, and thermal properties than neat PVA film, and was biodegradable. Therefore, this nanocomposite film is suggested as an alternative material for the current, non-biodegradable food packaging, in order to reduce plastic pollution.

2.1.3 Lewin's Change Model

Lewin is known for his 3-stage change model, which came from the idea that "the environment stimulates change behavior. In a stationary situation, change would not occur. For change to happen, it needs to be stimulated by societal forces. Positive stimuli (or the driving forces) need to be stronger than the negative stimuli (the barriers) for change to happen" (Roşca, 2020). The change model starts with unfreezing the current equilibrium. A move away from the existing situation is required to start a change. Secondly, (external) acting forces or drivers should be present to stimulate the change. This is the step where the actual change or transition is happening. The third step is about consolidating the change, so that people impacted do not revert to their old habits; the new situation must be 'refrozen' (Garfein et al., 2013). In order to connect the 3-stage change model to Lewin's broader field theory, it can be proposed that a specific force within the field is necessary to start the unfreezing of the existing situation (step 1). If this force exceeds the opposing forces from incumbent actors within an industry,

change will occur (step 2), ultimately leading to the establishment of a new norm as individuals adapt (step 3).

2.1.4 Field Forces & Consumer Behavior

Within the context of field forces, an important factor to consider is consumer behavior. Consumer behavior has a significant impact on sustainable transitions and affects the actions of incumbent actors in various industries (Kump, 2023), including supermarkets. The following articles explore consumer behavior and its effects based on existing literature, with relevance to the supermarket context.

Young people from Generation Z value money, and thus are conscientious in their consumption choices. However, people from this generation generally also have a sense of social justice and environmental awareness. Therefore, "environmental concerns, green future estimation and green perceived quality are potential determinants of Generation Z's consumption of green products and positively influence willingness to pay more for green products" (Gomes et al., 2023). Thus, it seems demand for sustainable products is increasing. Consumers in this segment are more likely to be females (Laroche et al., 2001).

Another factor is vegetarianism and meat consumption. The distribution of this personal belief in a population has an impact on demand for certain products in supermarkets. Vegetarians are more likely to believe that meat production is bad for the environment. Vegetarian diets are associated with lower BMI's and with reduced risk of death from heart disease (Haddad & Faed, 2014). Therefore, vegetarians are more interested in vegetables and fruit products and thus less meat (Mullee et al., 2017).

To make consumers more conscious of the environmental impact of their shopping behavior, Potter et al. (2022) examined the effectiveness of ecolabels and nutrition labels for promoting sustainable purchasing behavior. Participants were randomized to see products with environmental impact labels only, nutrition labels only, both environmental and nutrition labels, or no labels. The results showed that environmental impact labels alone or with nutrition labels significantly reduced the mean environmental impact scores of products in participants' shopping baskets compared to the control group with no labels. The study suggests that environmental impact labels can encourage more sustainable food choices, which helps to improve planetary health.

Another study, conducted by Bauer et al. (2022), found similar outcomes. This article discusses the potential for supermarkets to nudge consumers towards more sustainable and healthy food choices. A supermarket in Denmark was used to test multi-layered nudges, which resulted in small increases of sustainable grocery purchases. It showcases the possibility that supermarkets have agencies and ability to nudge consumers towards more sustainable groceries and could therefore foster a sustainable food transition.

Regarding food packaging, a study by Norton et al. (2023) investigated consumer behavior and knowledge towards sustainable food packaging in Greece and the United Kingdom. "Consumer awareness regarding packaging waste is increasing; however, information relating to different food packaging disposal strategies is not always readily available to the consumer" (Norton et al., 2023). A gap between knowledge and actual behavior is present, meaning that consumers lack motivation and incentives to act in a more sustainable way, although consumers believe avoiding excessive packaging has the strongest impact on the environment (Tobler et al., 2011).

Finally, people tend to be sensitive to advertisements, offers and discounts, also for healthy foods (Brimblecombe et al., 2017). Supermarkets can apply such marketing practices to products with a low environmental impact to boost sales and thereby increase recognition and awareness of sustainable products (Widdecke et al., 2022). Also, people tend to follow what their friends, family or other close acquaintances do, especially when it comes to buying decisions (Pavlović-Höck, 2022). Together this can lead to synergies and therefore an increased demand for sustainable, environmentally friendly products.

2.2 Unknown forces & Understanding Sustainability

Described in Chapter 2 so far are general challenges, practices and forces that are present in the food- and thus the supermarket industry. However, there is currently no detailed list of specific forces (drivers and barriers) that affect the behavior of existing actors in Dutch supermarkets. Therefore, this study aims to address and resolve this research gap.

Prior to delving into the results in Chapter 4, it is essential to establish a clear understanding of the concept of sustainability within different market players. For supermarkets, sustainability encompasses both the implementation of sustainable measures within their physical stores, such as utilizing solar panels for energy, as well as offering a wider range of sustainable products, such as chicken with a Beter Leven label.

Similarly, consumers also play a significant role in the examination of sustainability transitions in supermarkets. They can contribute to sustainability by actively purchasing and consuming more sustainable products available in stores. While this study focuses on the consumer perspective, it does not explore sustainability measures that individuals may undertake in their own lives, such as home insulation, as they are not directly relevant to the research objectives.

3. METHODOLOGY

3.1 Research Design & Data Collection

Since this thesis aims to investigate the subjective experiences, motivations, and attitudes of (incumbent) actors in sustainable transitions, a qualitative research approach was deemed appropriate (Bercht, 2021). Data was collected through semi-structured interviews, making it an interview study. Each interview was conducted in-person and was audio recorded and transcribed with the participants' consent, which was obtained prior to the interview. Participants were assured of their anonymity and confidentiality. The research also complied with relevant ethical guidelines and regulations from the University of Twente. Each interview was expected to last about an hour, but this could be longer depending on time-consuming discussions or explanations, from more open-ended questions or by broaching a new topic after answering the previous question. Flexibility was key here.

3.2 Sampling

The sample for this study consisted of eight individuals who were experts in the supermarket industry and had experience regarding sustainable transitions or sustainability in general. These stakeholders were selected through purposeful sampling, where they were chosen based on their knowledge, expertise, and experience in this field. While respecting anonymity and privacy, it is noteworthy to mention that the sample population included a diverse combination of branch managers and store owners from several major retail chains. Among them were individuals who recently completed substantial sustainability transitions and were thereby recognized with notable sustainability certifications and awards.

3.3 Data Analysis

Two approaches to qualitative research were used: deductive and inductive approaches. With deductive research, one started with a certain concept, and during the research, this concept was further explored. Inductive research was less structured; one started from a phenomenon of interest and then aimed to explore it without pre-defined categories. Using both approaches led to a broad and deep understanding of the topic and was a good way to answer the research question (Mayring, 2023).

Coding was used as a technique to analyze data. Deductive coding started with (pre-conceived) codes, which were then matched with excerpts that fit these codes. Inductive coding starts with data, which is then grouped into themes. Afterwards, from the data and themes, codes were developed. The coding was performed using Microsoft Excel. The outcomes of this coding process were divided into three sorts:

1. Type
2. Category
3. Sub-category

The type defined whether a factor was a driving force or a barrier, or possibly both. The *category* defined into what group this factor fell, while the sub-category gave further information or explanation. There could be more sub-categories falling under one main *category*, thus enhancing the support for this *category*.

In the presentation of the results in Chapter 4, the sub-categories are denoted by the inclusion of (IPX), indicating that the specific statement or information originated from Interviewed Person X.

4. RESULTS

4.1 Driving Forces

The initial driving force found is *consumer behavior,* considering the present connection between individuals and supermarkets due to the necessity of food consumption. Hence why consumer behavior plays an important role in influencing sustainability efforts within this context. Analysis of the data reveals instances where some consumers/customers actively engage with sustainability concerns while being in a supermarket. For instance, requests regarding the substitution of plastic bags with paper alternatives demonstrate a growing awareness of sustainability among consumers (IP1). The provision of transparent information regarding the background and attributes of sustainable products can influence the consumer decision-making processes (IP4). Collectively, this leads to a trend where consumers are becoming more interested in sustainable products, such as biological products or products with sustainability certifications, so demand for these products increases (IP2,3,5,6,7,8). In addition, the popularity of local products is also rising, driven by several factors. First being their limited availability elsewhere, and second being the shorter journey the product has taken to be in the store, as well as the positive thought of supporting local food producers and adopting the development of a circular economy (IP7). Furthermore, consumers giving positive feedback to implementing sustainability measurements can motivate supermarkets to become more sustainable (IP1).

The second driving force is *economic motivation*. This force is strongly connected with the third force, *government*. The government has undoubtedly the largest impact on sustainability transitions, as the rules and regulations they impose on supermarkets are mandatory (IP1,2,3,8). Actions aimed at implementing sustainable practices should be undertaken within a specified timeframe when it can be realized (IP7). In recent years, the government has implemented a range of measures targeting supermarkets. A recent example is the implementation of a deposit requirement on cans. Government oversight ensures compliance of supermarkets with these regulations, issuing fines for non-compliance, and, in severe cases, even imposing restrictions on the sale of certain products (IP1,5,8). Additionally, the government may deploy sustainability experts to provide feedback to store managers on areas of improvement concerning sustainability (IP3). Furthermore, the government possesses the authority to generate awareness and promote sustainability among the public through various campaigns (IP6).

To get back at the category *economic motivation*, supermarkets are motivated to avoid these fines and penalties as it generates unwanted financial costs (IP1,8). Moreover, the absence of sustainable measures can lead to a decline in customer base and, consequently, reduced turnover (IP1). Conversely, embracing sustainability initiatives can attract more customers, resulting in increased turnover (IP6). Additionally, sustainability measures, such as installing solar panels to reduce power consumption, can lead to cost savings for supermarkets (IP1,6,7,8). The availability of government subsidies can serve as a significant driving force for supermarkets to embark on sustainability transitions, as it lowers the economic barriers associated with such investments (IP1,3,4,6). Furthermore, sustainable practices, including local sourcing that can foster a circular economy (IP5), can make it easier for supermarkets to secure loans from banks that are keen on investing in sustainability projects, often offering incentives such as interest rate discounts (IP5,6).

The fourth driving force is *internal motivation*. Supermarkets strive to avoid negative publicity that can harm their reputation and potentially result in a decrease in customer base (IP1,2,8). Consequently, this intrinsic motivation drives them to adopt more sustainable practices. Moreover, certain supermarkets proactively embrace sustainability measures as part of their integrated long-term mission, taking preemptive action before government regulations are enforced (IP2,3). This proactive approach not only enhances their image but also generates goodwill among customers, fostering loyalty and positive brand perception (IP3,6).

Another driving force for sustainable transitions is the presence of *competitors* within the supermarket industry. Supermarkets learn from the actions of their competitors, assessing the effectiveness of various sustainability practices and incorporating successful strategies into their own operations (IP2).

Additionally, sustainability being a collective social goal necessitates mutual *cooperation.* Collaborative efforts are essential for driving sustainable transitions on a societal level, leveraging economies of scale to reduce costs and enhance the availability of resources required for sustainability initiatives (IP3,6).

Furthermore, *environmental benefits* can be achieved through waste reduction initiatives. For instance, programs like Albert Heijn's Overblijvers collect products close to their expiration date and offer them as a package at a strongly discounted price, therefore minimizing waste. Supermarkets can also prevent waste by donating surplus food to food banks (IP2). Furthermore, the inclusion of local sourcing can reduce transportation emissions (IP6).

External motivators, such as sustainability awards, can incentivize supermarkets to adopt sustainable practices, as winning an award can attract new customers (IP1,5). Additionally, external organizations like Greenpeace can exert pressure on both the government and individual supermarket branches, accelerating sustainability transitions (IP7).

Internal communication plays a crucial role in integrating the separate stores within a supermarket chain and engaging all

stakeholders in sustainable policies from the central office. The availability of feedback channels facilitates input and encourages participation (IP2,3,8). Pilot initiatives are often conducted in different supermarkets within the same chain to test and evaluate the feasibility and effectiveness of certain practices, helping to identify worthwhile sustainability investments (IP3).

Market type also influences sustainable transitions, particularly in the food industry where essential commodities exhibit low price elasticity. This means that consumers may continue purchasing products even if their prices increase due to sustainability efforts. This can mitigate doubts surrounding investment in sustainability (IP7).

Lastly, *technology* continually advances, yielding new sustainable innovations. Technological breakthroughs drive sustainable transitions by improving or reducing costs of sustainable practices. Adopting these innovations enables supermarkets to stay at the forefront of sustainable initiatives (IP5).

4.2 Barriers

The initial barrier for examination revolves around *consumer behavior*, a multifaceted category that incorporates both motivating and discouraging aspects. Consumers generally hold negative associations with sustainable products, often perceiving them as higher-priced (IP1). Some individuals are also sensitive to aesthetic considerations, perceiving sustainable products as less fashionable and lacking in trendy packaging (IP4). Furthermore, realizing behavioral change among a large group of individuals, as is the case in this context, is a complex and time-consuming effort (IP3). Consumers exhibit resistance to change, as they are accustomed to established routines and preferences (IP8). Their focus tends to gravitate towards immediate, short-term benefits. Therefore, individuals are more inclined to embrace sustainable change when it offers tangible, personal returns in the short run (IP5). In the absence of direct personal relevance, the motivation for change diminishes. Such egocentric tendencies prioritize self-interest over considerations for others or future generations (IP3,6). Consequently, most individuals are inclined to invest in and adopt change only when there is a perceived financial advantage (IP3,4,5,6). Moreover, despite a growing trend, the demand for sustainable stores and products remains relatively modest (IP5). This can be attributed to consumers involving in unconscious behaviours regarding sustainability, as well as their limited awareness of the broader consequences of their daily actions (IP2,6).

Subsequently, the *economic worth of sustainability investment* appears as a significant consideration, whereby supermarkets are confronted with a dilemma between complying with government-mandated practices and weighing the practicality and responsibility of such investments (IP6). For instance, energy companies and governmental entities advocate for the adoption of LED lights in supermarkets. However, if the existing lighting systems are still functional, replacing them prematurely would contradict principles of sustainability (IP1). Furthermore, embarking on sustainable investments requires financial preparedness, which may not be readily available to every franchise store (IP4). Typically, these stores strategically align their sustainable investments with complete store renovations, which occur, on average, once every ten years. This deliberate timing is essential to avoid investing in practices that may require following renovations shortly after. Additionally, temporary closure during renovations can result in reduced turnover, further highlighting the financial concerns at play (IP1,2).

Organizational change represents another significant barrier to sustainable transitions. Some practices, despite their sustainability benefits, may be perceived as impractical or time-consuming, resulting in postponement (IP1,3,8). This delay does not necessarily indicate a lack of willingness to become more sustainable, but rather reflects the challenges associated with transforming an entire chain of processes and the engagement of various stakeholders, each driven by their own interests (IP7). The pursuit of sustainability often introduces external reliance that supermarkets must contend with, and limited resources may hinder the rate of transition (IP8). Moreover, supermarkets must adhere to strict requirements and undergo regular checks to ensure compliance. The associated administrative burden can be frustrating, particularly when the significance of certain requirements may be subjectively questioned (IP2). Lastly, initiating a truly sustainable project can be challenging in terms of assembling a supportive team, as organizations often lack the necessary knowledge and expertise in sustainability-related matters (IP5).

Another significant barrier to sustainability is the *price of sustainability*, associated with both sustainable products and investments in physical stores or transportation networks. This category is strongly related to *consumer behavior.* Consumers are highly sensitive to price (IP2,3,4,5,7,8), particularly when it comes to sustainable products such as meat with certifications like Beter Leven, and especially when compared to alternatives available at local niche stores (IP1). The higher price of products with sustainability certifications, such as Beter Leven meat, can be attributed to several factors. These include the animals requiring longer raising periods, consuming more food, and occupying more space per square meter, which means less animals in the same area. Additionally, the price also encompasses the costs associated with branding and certification, collectively contributing to the higher price tag of products with sustainability labels (IP1).

This price sensitivity often leads consumers to seek lower-priced options, potentially resulting in a shift to different stores (IP3). As mentioned earlier in the explanation on *consumer behavior*, individuals are particularly conscious of their financial considerations, and when faced with higher prices, they are more likely to explore alternatives (IP7). Therefore, the price of sustainable products directly influences consumer decision-making and can contribute to a decrease in demand (IP3,4,6).

While the *government* plays a crucial role as a driving force for sustainability, it can also present barriers in certain ways. Rules and permit requirements imposed by the government can hinder sustainability renovations, leaving store managers with no choice but to continue operating in old, unsustainable buildings (IP5). The objections lodged by local residents can further obstruct the approval process, potentially resulting in the necessary permits for renovation of a store being denied (IP6). Moreover, the process of applying for subsidies can be complex and time-consuming, sometimes requiring the assistance of consultants or accountants, which incurs additional costs for the supermarket (especially franchise stores) (IP6). Furthermore, it is important to recognize that the government's economic considerations can also impact sustainability efforts. In cases where large, but unsustainable companies are present in the Netherlands, if the government imposes strict sustainability requirements on them, it can lead to potential issues. If these companies face significant challenges and subsequently relocate to another country or go bankrupt, the government stands to lose tax revenues and the unemployment rate may increase (IP7).

Another considerable barrier is the existing *infrastructure*, which may not be sufficiently prepared to accommodate changes, particularly in the energy grid. As more supermarkets transition to gasless operations and rely more on electricity, the capacity of the energy grid may become insufficient to meet the increased

power demand. This can create challenges in terms of power supply and stability (IP5). In addition, investing in sustainable practices like installing solar panels grants the opportunity to contribute excess electricity back to the energy grid. However, in certain areas, the grid infrastructure may not have the capacity to handle such contributions, leading to technical limitations and disruptions in the system (IP6).

The next factor is *people*, in the sense of global population size, which presents a challenge to achieving sustainability objectives. The sheer magnitude of human population puts vast pressure on natural resources, worsens environmental degradation, and strains social and economic systems, making it increasingly difficult to attain sustainable practices and outcomes (IP4).

Research represents a notable category that can delay sustainable transitions, particularly when the focus is limited to a narrow national perspective. Simply relocating unsustainable practices to other countries does not serve as a comprehensive solution, as the underlying issues remain unresolved (IP4). Additionally, the effectiveness of sustainable investments in both products and practices often requires long-term evaluation to establish their true benefits. Consequently, consumers may lack awareness and understanding regarding sustainable products, hindering their ability to perceive their practicality and value (IP4). The ambiguity surrounding sustainability further contributes to consumer uncertainty and ignorance regarding the distinction between sustainable and non-sustainable choices (IP6).

The role of *suppliers* forms another barrier to achieving greater sustainability, primarily due to the prevailing trend of suppliers assigning shorter expiry dates to their products. This practice is driven by their desire to mitigate potential food safety risks and associated liabilities. However, it leads to a situation where stores may be forced to dispose products that are still suitable for consumption, thereby contributing to food waste. Consequently, stores are forced to replenish their inventory by placing additional orders, which in turn amplifies transportation emissions. This combination of wasteful practices and increased transportation requirements hinders progress towards sustainable outcomes (IP7).

4.3 Driving Force/Barrier

Public opinion can be viewed as both a driving force and a barrier in the context of sustainability. While public opinion is primarily shaped by factors such as consumer behavior, it is also influenced by other forces. Overall, public opinion plays a central role in driving sustainability efforts, as companies, including supermarkets, tend to align with and respond to public sentiment to keep their customer base (IP4). Consequently, influencing public opinion becomes key in either accelerating or impeding sustainable transitions (IP7). Consumer behavior plays a significant role in shaping the industry and policies of supermarkets, and this behavior is in turn influenced by public opinion. Therefore, the key catalyst for driving change lies in influencing people's opinions and attitudes towards sustainability (IP8).

4.4 Visual Model

In order to enhance clarity and make the information more intuitive, a visual model is employed as seen in Figure 1.

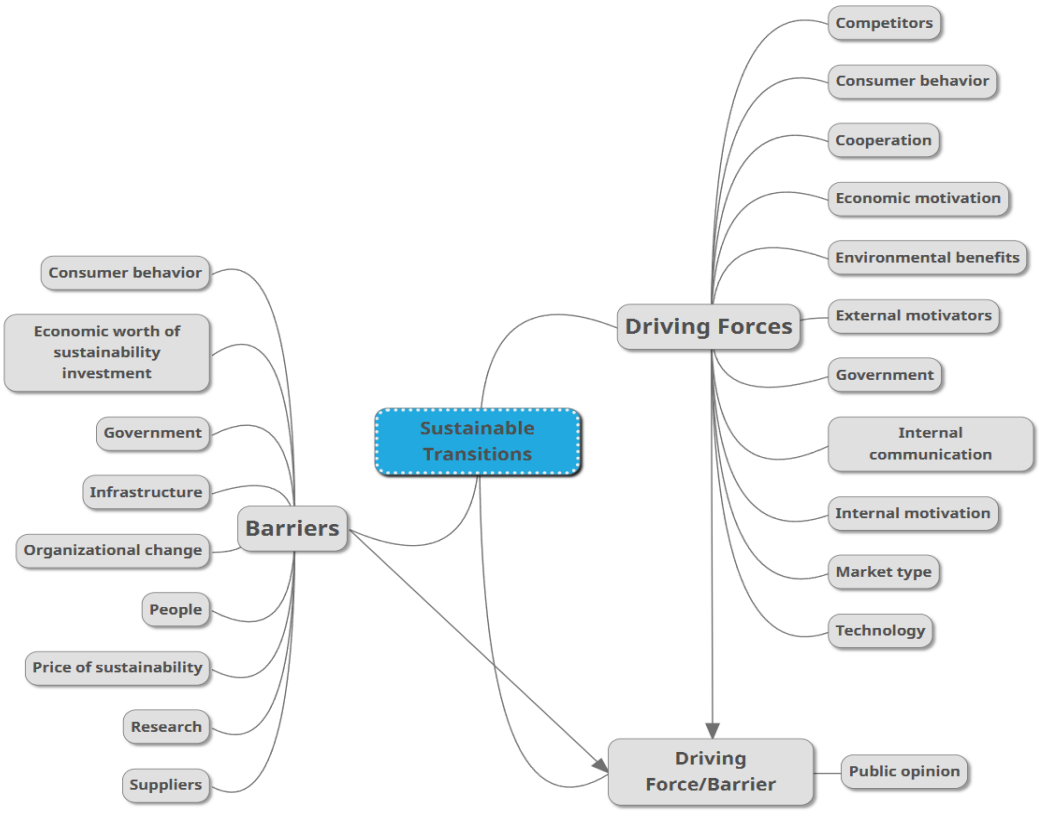

Figure 1: Visual Model

5. DISCUSSION

5.1 Discussing Results

The results found in Chapter 4 provide meaningful insights into the driving forces and barriers associated with sustainability transitions in the supermarket industry, and therefore provide empirical support for the literature reviewed in Chapter 2. Some of the findings align with theories in this chapter, where Long et al. (2018) also identified collaboration, technological innovation, economic motivation, and external events as critical success factors for implementing sustainable business models and facilitating a sustainable transition. The results also support the assertions made by Zwart & Wertheim-Heck (2021) regarding the potential of local food retailing in reducing transportation emissions, while acknowledging the complexities inherent in the supply chain. Potter et al. (2022) and Bauer et al. (2022) researching the effectiveness of environmental impact labels and nudging strategies in promoting sustainable food choices show how to influence consumer behavior contributing to a sustainable transition. These studies support the finding that both consumer behavior and public opinion play a crucial role in either driving or hindering sustainability transitions, while Cakar's (2022) study on reducing food waste through redistribution aligns with initiatives taken by supermarkets, such as programs like Overblijvers or food donations to food banks. Additionally, Arun et al.'s (2021) research on reducing plastic pollution corresponds to the growing trend of consumers being increasingly aware of sustainability and actively seeking new sustainable solutions from stores. Chaturvedi et al. (2020) found that plastic packaging waste poses significant environmental concerns as plastic recycling is difficult, and substantial amounts of plastic end up either in ocean's or get incinerated, supporting the finding that simply relocating unsustainable practices to other countries does not serve as a solution, as the underlying issues remain unsolved. Furthermore, the discussed results confirm the increased demand for sustainable products (Gomes et al., 2023), lack of sustainable behavior (Norton et al., 2023; Tobler et al., 2011) and the price sensitivity of consumers (Brimblecombe et al., 2017).

Based on personal analysis, minimal discrepancies between the findings of this study and the existing literature discussed in the theoretical framework (Chapter 2) were found. However, contradictions do emerge within the study's results. Findings imply a growing awareness and interest among consumers in sustainable products, leading to increased demand. Conversely, the demand for sustainable stores and products remains relatively modest, indicating an increase in consumers showing engagement in sustainability. However, the majority of consumers have not fully embraced sustainability as a primary factor in their purchasing decisions. This suggests the potential for further education and promotion to increase the demand for sustainable options among a broader consumer base. Furthermore, while sustainability initiatives can attract more customers and increase turnover, consumers still exhibit price sensitivity and may opt for lower-priced alternatives, potentially decreasing demand for sustainable products. Moreover, the government plays a significant role in driving sustainability transitions through regulations, fines, and awareness campaigns. Conversely, government rules and permit requirements can hinder sustainability renovations, and the complex process of applying for subsidies can possibly incur additional costs for supermarkets. Finally, collaborative efforts and learning from competitors are essential driving forces for sustainability. Nonetheless, limited resources and external dependence can hinder the rate of transition.

The main contradiction lies in the dual nature of public opinion in the context of sustainability. On one hand, public opinion is viewed as a driving force for sustainability, as it influences companies' actions and policies to align with public sentiment. Companies, including supermarkets, generally respond to the public opinion to maintain their customer base. This indicates that public opinion can be a catalyst for change. On the other hand, public opinion can also act as a barrier to sustainability. If public opinion is not favorable towards sustainability or lacks awareness and understanding of its importance, it can hinder the progress of sustainable initiatives. In such cases, influencing public opinion (government's power) becomes crucial in overcoming this barrier.

Lewin's field theory highlights the interaction of forces in a dynamic, social environment. Change is influenced by the interaction of different forces within the field. The existence of contradicting forces, along with other driving forces and barriers, create a state of equilibrium or balance, where the push for sustainability and the resistance to change offset each other. The presence of these contradictions indicate that sustainable transitions endure delays because of the equilibrium between opposing forces. For change to happen, it is necessary to alter the balance of these forces by strengthening the driving forces and weakening the barriers.

However, the close connection between public opinion and consumer behavior implies that these two factors primarily influence sustainable transitions, while the other mentioned drivers and barriers are more indirectly linked to the transition process itself. These forces serve to rebalance the equilibrium between public opinion and consumer behavior, which ultimately has the potential to initiate change and therefore drive sustainability transitions.

5.2 Research Limitations & Further Research

This study has several research limitations that should be acknowledged. Firstly, the coding process used to analyze the data is relatively subjective in nature, and the results are dependent partly on the interpretation of the researcher. The transformation of raw, unfiltered data into usable data involves subjective thinking, which introduces the potential for bias or misinterpretation. Another limitation is the inability to contact key decision-makers in supermarket organizations who hold the authority to shape sustainability policies. This lack of access to individuals in higher positions limits the comprehensive understanding of their perspectives and insights into sustainability practices within the industry. Additionally, two major supermarkets, Lidl and Aldi, declined to support this study and chose not to provide any information. Their refusal to participate hindered the collection of valuable data and perspectives from these significant players in the supermarket sector. Furthermore, their request for personal information in exchange for cooperation raised some privacy concerns.

Future studies should strive to address these limitations by employing more objective coding processes, creating stronger connections with industry stakeholders, and ensuring comprehensive data collection from a broader range of participants.

Additionally, further exploration and research are necessary to determine the precise strength of the individual forces described and their specific influence on the transition process. This investigation would provide valuable insights to supermarkets and other stakeholders involved, guiding them in identifying the key factors they should prioritize to achieve an efficient and effective transition.

6. CONCLUSION

In conclusion, and to answer the research question, the driving forces and barriers to sustainability transitions in the supermarket industry encompass a range of factors that interact and influence each other. The main driving forces identified include consumer behavior, economic motivation, government regulations, and internal motivation. Consumer behavior plays a crucial role in influencing sustainability efforts, with increasing awareness and demand for sustainable products and local offerings. Economic motivation drives supermarkets to avoid fines, attract customers, and achieve cost savings through sustainable practices. Government oversight, regulations and subsidies can both force and incentivize sustainability transitions and generate awareness among the public. Internal motivation pushes supermarkets to adopt sustainability measures to enhance their reputation and brand perception.

Other driving forces include competitor actions, cooperation, environmental benefits, external motivators, internal communication, market type, and technological advancements. Competitors' actions inspire supermarkets to learn from successful sustainability practices and incorporate them into their operations. Collaboration and cooperation leverage economies of scale for sustainability initiatives. Environmental benefits are achieved through waste reduction initiatives, and external motivators such as sustainability awards encourage supermarkets to adopt sustainable practices. Internal communication facilitates integration and stakeholder engagement, while the inelastic nature of essential commodities such as food mitigate the price sensitivity among consumers. Technological advancements drive sustainable innovations in the industry.

The major barriers identified include again consumer behavior, but moreover economic worth of sustainability investment, organizational change, and the price of sustainability. Consumer behavior includes resistance to change, price sensitivity, and limited awareness of the consequences of daily actions. Economic considerations and financial constraints can hinder the adoption of sustainable practices, particularly for smaller franchise stores. Furthermore, organizational change and the administrative burden, along with the challenges of aligning stakeholders' interests, pose a significant barrier. The price of sustainability, both products and investments, can lower consumer demand and therefore hinder sustainability efforts.

Moreover, other barriers include government regulations, infrastructure limitations, global population size, research limitations, and supplier practices. Government regulations and permit requirements, the complexity of subsidy applications, and economic considerations of the government can impede sustainability transitions. Infrastructure limitations, such as insufficient energy grid capacity, can hinder the adoption of using more sustainable energy sources. The global population size puts pressure on natural resources and makes sustainability goals challenging to achieve. Research limitations and lack of consumer knowledge contribute to uncertainty and ignorance about sustainable choices. Supplier practices, such as shorter expiry dates, contribute to food waste and increased transportation emissions.

Public opinion is a crucial and dynamic factor in driving sustainability efforts within the supermarket industry. It acts as both a driving force and a barrier, depending on prevailing sentiments and attitudes towards sustainability. Since public opinion is closely related to consumer behavior, companies, including supermarkets, closely align with public sentiment to retain their customer base and respond to consumer demand for sustainable products. Influencing public opinion is therefore vital for accelerating sustainable transitions, as consumer behavior is a significant force that shapes the industry. To drive change effectively, it is essential to influence people's opinions and attitudes towards sustainability.

Furthermore, this study provides empirical support for the existing literature on sustainability transitions in the supermarket industry. Multiple findings align with various theories and research, while it also reveals contradictions within the findings. The presence of contradictions within the field forces creates an equilibrium that slows down the pace of sustainable transitions. Lewin's field theory states that to facilitate change, it is necessary to modify this balance by strengthening the driving forces and weakening the barriers. Public opinion and consumer behavior emerge as key factors that directly influence sustainability transitions, while other drivers and barriers are more indirectly influencing the transition process.

Lastly, this study acknowledges several research limitations that have impacted its findings. The subjective nature of the coding process used for data analysis introduces the potential for bias and misinterpretation. Additionally, the lack of access to key decision-makers in supermarket organizations and the refusal of participation by major players such as Lidl and Aldi limit the complete understanding of sustainability practices in the industry. Future studies should address these limitations by employing more objective coding processes, establishing stronger connections with industry stakeholders, and collecting data from a broader range of participants. Furthermore, further research is needed to determine the precise strength and influence of the individual forces involved in the transition process, providing valuable insights for supermarkets and stakeholders to prioritize their efforts for an efficient and effective transition.

7. REFERENCES

1. Arun, R., Shruthy, R., Preetha, R., & Sreejit, V. (2021). Biodegradable nano composite reinforced with cellulose nano fiber from coconut industry waste for replacing synthetic plastic food packaging. *Chemosphere*, *291*, 132786. https://doi.org/10.1016/j.chemosphere.2021.132786
2. Bauer, J., Hansen, P. G., Aarestrup, S. C., & Reisch, L. A. (2022). Nudging more sustainable grocery purchases: Behavioural innovations in a supermarket setting. *Technological Forecasting and Social Change*, *179*, 121605. https://doi.org/10.1016/j.techfore.2022.121605
3. Bercht, A. L. (2021). How qualitative approaches matter in climate and ocean change research: Uncovering contradictions about climate concern. Global Environmental Change-human and Policy Dimensions, 70, 102326. https://doi.org/10.1016/j.gloenvcha.2021.102326
4. Brimblecombe, J., Ferguson, M. C., Chatfield, M. D., Liberato, S. C., Gunther, A., Ball, K., Moodie, M., Miles, E. W., Magnus, A., Mhurchu, C. N., Leach, A. J., & Potvin, L. (2017). Effect of a price discount and consumer education strategy on food and beverage purchases in remote Indigenous Australia: a stepped-wedge randomised controlled trial. *The Lancet. Public health*, *2*(2), e82–e95. https://doi.org/10.1016/s2468-2667(16)30043-3
5. Bustillo-Lecompte, C. F., & Mehrvar, M. (2015). Slaughterhouse wastewater characteristics, treatment, and management in the meat processing industry: A review on trends and advances. *Journal of Environmental Management*, *161*, 287–302. https://doi.org/10.1016/j.jenvman.2015.07.008

6. Cakar, B. (2022). Bounce back of almost wasted food: Redistribution of fresh fruit and vegetables surpluses from Istanbul's supermarkets. *Journal of Cleaner Production*, *362*, 132325. https://doi.org/10.1016/j.jclepro.2022.132325
7. CBS. (2022, 9 september). *Hoeveel winkels zijn er? - Nederland in cijfers 2022*. Hoeveel winkels zijn er? - Nederland in cijfers 2022 | CBS. https://longreads.cbs.nl/nederland-in-cijfers-2022/hoeveel-winkels-zijn-er/
8. Centraal Bureau voor de Statistiek. (2023, 28 februari). *Detailhandel zet ruim 11 procent meer om in januari*. https://www.cbs.nl/nl-nl/nieuws/2023/09/detailhandel-zet-ruim-11-procent-meer-om-in-januari
9. Chaturvedi, S., Yadav, B. P., Siddiqui, N. A., & Chaturvedi, S. K. (2020). Mathematical modelling and analysis of plastic waste pollution and its impact on the ocean surface. *Journal of Ocean Engineering and Science*, *5*(2), 136–163. https://doi.org/10.1016/j.joes.2019.09.005
10. Chen, L., Hu, Z., Hu, X., & Xu, G. (2023). How do green industrial policies accelerate regional sustainability transition? A spatiotemporal evaluation of policy with a relationalist perspective. *Journal of Cleaner Production*, *404*, 136797. https://doi.org/10.1016/j.jclepro.2023.136797
11. *Climate Change and Food Security: A Framework Document - World*. (2008, 1 mei). ReliefWeb. https://reliefweb.int/report/world/climate-change-and-food-security-framework-document
12. Despoudi, S., Bucatariu, C. A., Ötleş, S., Kartal, C., Despoudi, S., & Bucatariu, C. A. (2021). Food waste management, valorization, and sustainability in the food industry. *Elsevier eBooks*, 3–19. https://doi.org/10.1016/b978-0-12-820563-1.00008-1
13. Everingham, Y., & Reason, C. J. C. (2011). Interannual variability in rainfall and wet spell frequency during the New South Wales sugarcane harvest season. *International Journal of Climatology*, *31*(1), 144–152. https://doi.org/10.1002/joc.2066
14. Garfein, S., Horney, N. F., & Nelson, M. (2013). Managing change in organizations. *Paper presented at PMI® Global Congress 2013—North America, New Orleans, LA. Newtown Square, PA: Project Management Institute.* https://www.pmi.org/learning/library/managing-change-organizations-5872
15. Geels, F. W. (2014, 27 juni). Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society*. https://doi.org/10.1177/0263276414531627
16. Gomes, S., Lopes, J. T., & Da Silva Nogueira, S. P. (2023). Willingness to pay more for green products: A critical challenge for Gen Z. *Journal of Cleaner Production*, *390*, 136092. https://doi.org/10.1016/j.jclepro.2023.136092
17. Haddad, E. S., & Faed, P. (2014). Vegetarianism and Veganism. *Elsevier eBooks*. https://doi.org/10.1016/b978-0-12-801238-3.00241-5
18. Huarng, K., & Mas-Tur, A. (2016). Turning Kurt Lewin on his head: Nothing is so theoretical as a good practice. *Journal of Business Research*, *69*(11), 4725–4731. https://doi.org/10.1016/j.jbusres.2016.04.022
19. Ingram, J. (2011). A food systems approach to researching food security and its interactions with global environmental change. *Food Security*, *3*(4), 417–431. https://doi.org/10.1007/s12571-011-0149-9
20. Ipcc, N. (2022). Global Warming of 1.5°C. *Cambridge University Press*. https://doi.org/10.1017/9781009157940
21. James, S. J., & James, C. D. (2010). The food cold-chain and climate change. *Food Research International*, *43*(7), 1944–1956. https://doi.org/10.1016/j.foodres.2010.02.001
22. Kump, B. (2023). Lewin's field theory as a lens for understanding incumbent actors' agency in sustainability transitions. *Environmental innovation and societal transitions*, *46*, 100683. https://doi.org/10.1016/j.eist.2022.11.008
23. Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. Journal of Consumer Marketing, Vol. 18. No. 6, pp. 503-520. https://www-emerald-com.ezproxy2.utwente.nl/insight/content/doi/10.1108/EUM0000000006155/full/pdf?title=targeting-consumers-who-are-willing-to-pay-more-for-environmentally-friendly-products
24. Lewin, K. (1939). Field Theory and Experiment in Social Psychology: Concepts and Methods. *American Journal of Sociology*, *44*(6), 868–896. https://doi.org/10.1086/218177
25. Long, T. B., Looijen, A., & Blok, V. (2018). Critical success factors for the transition to business models for sustainability in the food and beverage industry in the Netherlands. *Journal of Cleaner Production*, *175*, 82–95. https://doi.org/10.1016/j.jclepro.2017.11.067
26. Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, *41*(6), 955–967. https://doi.org/10.1016/j.respol.2012.02.013
27. Mayring, P. A. (2023). Qualitative content analysis. In *Elsevier eBooks* (pp. 314–322). https://doi.org/10.1016/b978-0-12-818630-5.11031-0
28. Miller, G. D., Ragalie-Carr, J., & Torres-Gonzalez, M. (2023). Seeing the forest through the trees: the importance of the food matrix in diet quality and human health. *Advances in Nutrition*. https://doi.org/10.1016/j.advnut.2023.03.005
29. Mullee, A., Vermeire, L., Vanaelst, B., Mullie, P., Deriemaeker, P., Leenaert, T., De Henauw, S., Dunne, A., Gunter, M. J., Clarys, P., & Huybrechts, I. (2017). Vegetarianism and meat consumption: A comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. *Appetite*, *114*, 299–305. https://doi.org/10.1016/j.appet.2017.03.052
30. Naidoo, M., & Gasparatos, A. (2023). Consumer worldviews and perspectives on environmental sustainability initiatives in the South African supermarket sector. *Journal of Cleaner Production*, 137496. https://doi.org/10.1016/j.jclepro.2023.137496
31. Norton, V., Oloyede, O. O., Lignou, S. (2023). Understanding consumers' sustainability knowledge and behaviour towards food packaging to develop tailored consumer-centric engagement campaigns: A Greece and the United Kingdom perspective. (2023d). *ScienceDirect*. https://doi.org/10.1016/j.jclepro.2023.137169
32. Oliveira-Castro, J. M. (2003). Effects of base price upon search behavior of consumers in a supermarket:

An operant analysis. *Journal of Economic Psychology*. https://doi.org/10.1016/s0167-4870(03)00006-0
33. Parfitt, J. P., Barthel, M., & Macnaughton, S. J. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B*, *365*(1554), 3065–3081. https://doi.org/10.1098/rstb.2010.0126
34. Pavlović-Höck, N. (2022). Herd behaviour along the consumer buying decision process - experimental study in the mobile communications industry. *Digital business*, *2*(1), 100018. https://doi.org/10.1016/j.digbus.2021.100018
35. Potter, C., Pechey, R., Cook, B. J., Bateman, P. T., Stewart, C., Frie, K., Clark, M. R., Piernas, C., Rayner, M., & Jebb, S. A. (2022). Effects of environmental impact and nutrition labelling on food purchasing: An experimental online supermarket study. *Appetite*, *180*, 106312. https://doi.org/10.1016/j.appet.2022.106312
36. Reutter, B., Lant, P., Reynolds, C., & Lane, J. (2017). Food waste consequences: Environmentally extended input-output as a framework for analysis. *Journal of Cleaner Production*, *153*, 506–514. https://doi.org/10.1016/j.jclepro.2016.09.104
37. Roşca, V. (2020). Implications of Lewin's Field Theory on Social Change. *Proceedings of the . . . International Conference on Business Excellence*, *14*(1), 617–625. https://doi.org/10.2478/picbe-2020-0058
38. Rossi, J., & Bianchini, A. (2022). "Plastic waste free" – A new circular model for the management of plastic packaging in food value chain. *Transportation research procedia*, *67*, 153–162. https://doi.org/10.1016/j.trpro.2022.12.046
39. Schmidhuber, J., & Tubiello, F. N. (2007). Global food security under climate change. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(50), 19703–19708. https://doi.org/10.1073/pnas.0701976104
40. Skeirytė, A., Krikštolaitis, R., & Liobikienė, G. (2022). The differences of climate change perception, responsibility and climate-friendly behavior among generations and the main determinants of youth's climate-friendly actions in the EU. *Journal of Environmental Management*, *323*, 116277. https://doi.org/10.1016/j.jenvman.2022.116277
41. Skoufias, E., Rabassa, M., & Olivieri, S. (2011). The Poverty Impacts of Climate Change: A Review of the Evidence. *ResearchGate*. https://www.researchgate.net/publication/228289405_The_Poverty_Impacts_of_Climate_Change_A_Review_of_the_Evidence
42. Statista. (z.d.). *Food - Worldwide | Statista Market Forecast*. https://www.statista.com/outlook/cmo/food/worldwide
43. Taub, D. R., Miller, B. J., & Allen, H. (2008). Effects of elevated CO_2 on the protein concentration of food crops: a meta-analysis. *Global Change Biology*, *14*(3), 565–575. https://doi.org/10.1111/j.1365-2486.2007.01511.x
44. Tobler, C., Visschers, V. H., & Siegrist, M. (2011). Eating green. Consumers' willingness to adopt ecological food consumption behaviors. *Appetite*, *57*(3), 674–682. https://doi.org/10.1016/j.appet.2011.08.010
45. Vermeulen, S. J., Aggarwal, P. K., Ainslie, A., Angelone, C., Campbell, B. C., Challinor, A. J., Hansen, J. D., Ingram, J., Jarvis, A., Kristjanson, P. M., Lau, C. B., Nelson, G. C., Thornton, P. K., & Wollenberg, E. K. (2012). Options for support to agriculture and food security under climate change. *Environmental Science & Policy*, *15*(1), 136–144. https://doi.org/10.1016/j.envsci.2011.09.003
46. Vermeulen, S. J., Campbell, B. C., & Ingram, J. (2012). Climate Change and Food Systems. *Annual Review of Environment and Resources*, *37*(1), 195–222. https://doi.org/10.1146/annurev-environ-020411-130608
47. Weber, O., & Saunders-Hogberg, G. (2018). Water management and corporate social performance in the food and beverage industry. *Journal of Cleaner Production*, *195*, 963–977. https://doi.org/10.1016/j.jclepro.2018.05.269
48. Widdecke, K. A., Keller, W. I., Gedenk, K., & Deleersnyder, B. (2022). Drivers of the synergy between price cuts and store flyer advertising at supermarkets and discounters. *International Journal of Research in Marketing*. https://doi.org/10.1016/j.ijresmar.2022.10.001
49. Ziervogel, G., & Ericksen, P. J. (2010). Adapting to climate change to sustain food security. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(4), 525–540. https://doi.org/10.1002/wcc.56
50. Zwart, T. A., & Wertheim-Heck, S. (2021). Retailing local food through supermarkets: Cases from Belgium and the Netherlands. *Journal of Cleaner Production*, *300*, 126948. https://doi.org/10.1016/j.jclepro.2021.126948

8. APPENDIX

Main Driving Forces

Category	Sub-category
Consumer behavior (IP1,2,3,4,5,6,7,8)	• Consumer ideas • Consumer motivation • Consumers are becoming more conscious about sustainability • Consumers are becoming more conscious about their behavior • Demand of sustainable products • Growing interest in sustainable packaging

	• Information making customers more conscious • Interest in local products • Positive feedback • Transparency influences decision making
Economic motivation (IP1,3,4,5,6,7,8)	• Avoiding extra costs or fines • Avoiding lower number of customers • Bank loan • Local supply (circular economy) • Lower costs • More turnover • Subsidy
Government (IP1,2,3,4,5,6,7,8)	• Marketing campaigns • National regulations • Sustainability experts
Internal motivation (IP2,3,6,8)	• Avoiding negative image • Goodwill • Mission of the company • Positive image • Trying to act before things are required by the government.

Table 1a: Main Driving Forces

Other Driving Forces

Category	**Sub-category**
Competitors (IP2)	• Learning from competitors' actions
Cooperation (IP3,6)	• Cooperation to improve sustainable transitions by making use of the benefits of scale
Environmental benefits (IP2)	• Reducing waste
External motivators (IP1,5,7)	• Interest groups • Sustainability awards
Internal communication (IP2,3,8)	• Being listened to motivates to give feedback • Cooperation to improve sustainable transitions • Pilots
Market type (IP7)	• Price elasticity
Technology (IP5)	• Innovations

Table 1b: Other Driving Forces

Main Barriers

Category	**Sub-category**
Consumer behavior (IP1,2,3,4,5,6,8)	• (Negative) associations with sustainable products • Changing behavior takes time • Consumers are sensitive to looks of products • Consumers do not like change • Consumers only focus on the short-term benefits • Demand for sustainable stores • Demand of sustainable products

	• Economic motivation • Unconscious behavior regarding sustainability
Economic worth of sustainability investment (IP1,2,4,6)	• Realistic investment • Required financial buffer • Timing of sustainability investment
Organizational change (IP1,2,3,5,7,8)	• Chain of processes and stakeholders • Extra administration • Lack of knowledge/teams
Price of sustainability (IP1,2,3,4,5,6,7,8)	• Consumer comparisons • Consumers going to a different store because of the higher price. • Consumers mainly looking at price • Economic motivation • Longer processing of sustainable products • Lower demand

Table 2a: Main Barriers

Other Barriers

Category	**Sub-category**
Government (IP5,6,7)	• Economic motivation • Rules and permits • Subsidy
Infrastructure (IP5,6)	• Energy grid
People (IP4)	• Too many people
Research (IP4,6)	• Consumer knowledge • Global view on sustainability, instead of only focusing on home country. • True benefit of sustainable innovation
Suppliers (IP7)	• Shorter expiry date

Table 2b: Other Barriers

Driving Force/Barrier

Category	**Sub-category**
Public opinion (IP4,6)	• Companies follow public opinion • Influencing public opinion can either speed up or slow down sustainable transitions

Table 3: Driving Force/Barrier