Challenging Big Food Sustainability: Dietary Change and Corporate Legitimacy in the Agrifood Landscape

by

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Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Statement of Contributions

The research for this thesis was conducted with funding from a Social Sciences and Humanities Research Council of Canada (SSHRC) Doctoral Fellowship.

Chapter 3 presents the theoretical framework that was used as a basis for this work. This was co-developed with Professor Jennifer Clapp as a part of the introduction to a special issue in *Global Environmental Politics* on the Global Environmental Politics of Food and Agriculture. Professor Clapp took the lead in authoring the original framework and I provided additional writing and research support for it. I have taken the original framework and applied it, focusing on legitimacy and exploring the specific implications of this framework for the governance of sustainable diets.

Professor Jennifer Clapp has supervised the work completed in this thesis and provided editorial feedback in the preparation of all chapters within.

Abstract

Growing awareness of the environmental, health, and social impacts from the foods we eat has meant renewed attention on the concept of 'sustainable diets'. The sustainable diets literature, to date, has focused on the environmental impact of meat and dairy, and the potential for environmental improvements from individual dietary change. However, given increased consumption of ultra-processed foods (formulations of industrial ingredients made to be convenient, palatable and profitable) along with their environmental and health impacts, it is important to also examine the role of the corporations that manufacture these foods in debates around sustainability. The world's largest food and beverage manufactures, collectively known as "Big Food" corporations, are the primary makers of ultra-processed foods and are working extensively frame themselves as having a legitimate role in the food system through a variety of corporate social responsibility (CSR) efforts. This thesis examines three questions. 1) What sustainability strategies are Big Food companies pursuing to claim legitimacy? 2) How do insights from the literature on the global governance of food and the environment help us understand Big Food companies' choice of sustainability strategies? 3) What are the policy implications of Big Food sustainability strategies for achieving sustainable diets?

To answer these questions, the research examined sustainability reports, policies, and positions of the eleven largest food and beverage manufacturers globally. The thesis identifies three main strategies connected to sustainable diets that make up part of the larger sustainability activities of these companies. First, as a portion of their CSR, firms engage a variety of 'scientized' data and discourses to measure and discuss their sustainability performance. Second, responsible sourcing has become a strategy of all corporations in the sector, based on the assumption that sustainably-sourced ingredients will make a product sustainable when it reaches consumers. Finally, product-portfolio management ensures that companies have varied portfolios that increasingly feature products deemed environmentally-friendly and healthy. After the strategies were identified, the thesis applied an analytical framework that outlines key political and economic characteristics of the global agrifood landscape that matter for global environmental politics of food. This analytical framework was used to analyze how these features enable corporate actors to make legitimacy claims about the work they are doing and their role in future food security and sustainability.

The research from this dissertation illuminates the policy implications of the sustainability strategies being implemented and the governance context in which they are established. First, Big Food companies are pursuing narrow visions of sustainability that may obfuscate issues and their linkages in the food system. Second, the features of the agrifood landscape, as well as unique characteristics of the sustainable diets debate, enable these corporate actors to tie their legitimacy claims to their corporate sustainability work to establish themselves as part of the solution to challenges in the food system. Finally, these strategies, articulated in this context of fraught food politics and sustainable diets debates, protect corporate growth and mitigate risk, partially by downloading risk and responsibility onto the most vulnerable actors in the food system. The intention behind recent conceptualizations of sustainable diets – established at a 2011 scientific symposium – was to bring forward a holistic vision of the food system that recognizes the interconnected nature of human health and ecosystems. However, the interpretation of the concept through corporate sustainability raises important questions about the legitimacy of Big Food corporations and their role in the future of food security and sustainability.

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Dedication

This thesis is dedicated to the memory of Emily Mann (July 29, 1991 - January 16, 2018). I am inspired every day by your spirit of community, your drive for justice and your indelible impact on this world. I strive in my lifetime to make even half the dent you made in your short time with us. It was the greatest honour to know you and spend time on this journey together as colleagues.

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List of Abbreviations

ABF	Associated British Foods
BCFN	Barilla Center for Food and Nutrition
HAFL	Bern University of Applied Sciences School of Agricultural, Forest and Food Sciences
CAFOs	Concentrated Animal Feeding Operations
CAGNY	Consumer Analysts Group of New York
CAQDAS	Computer Assisted Qualitative Data AnalysiS
CDP	Carbon Disclosure Project
CFS	United Nations Committee on World Food Security
COP21	Conference of the Parties 21
CSR	Corporate Social Responsibility
DGAC	Dietary Guidelines Advisory Committee
DPAC	Dairy Processors Association of Canada
FAO	Food and Agricultural Organization of the United Nations
FARM	Farmers Assuming Responsible Management
FLA	Fair Labour Association
FReSH	Food Reform for Sustainability and Health
G20	Group of 20
GAIN	Global Alliance for Improved Nutrition
GEP	Global Environmental Politics
GAP	Good Acricultural Practices
GMA	Grocery Manufacturers Association
GMOs	Genetically Modified Organisms
GRI	Global Reporting Initiative
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
ICN2	International Conference on Nutrition
IPES-Food	International Panel of Experts on Sustainable Food Systems
LCA	Life Cycle Assessment
LMICs	Low and Middle Income Countries
MSC	Marine Stewardship Council
NGO	Non Governmental Organization

POPs	Persistent Organic Pollutants
RISE	Response-Inducing Sustainability Evaluation
RSPO	Roundtable on Sustainable Palm Oil
RTRS	Roundtable on Responsible Soy
SAI	Sustainable Agriculture Initiative
SBT	Science-Based Target
SBTi	Science-Based Targets Initiative
SDG	Sustainable Development Goal
SDIL	Soft Drinks Industry Levy
SFI	Sustainable Farming Initiative
SMETA	Sedex Members Ethical Trade Audit
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGC	United Nations Global Compact
USDA	United States Department of Agriculture
VEB	Ventures and Emerging Brands
WBCSD	World Business Council for Sustainable Development
WCF	World Cocoa Foundation
WEF	World Economic Forum
WHO	World Health Organization
WRI	World Resources Institution
WWF	World Wildlife Fund

Chapter 1 Introduction

At the 2018 World Economic Forum (WEF) in Davos, Switzerland, the World Business Council for Sustainable Development (WBCSD), the EAT Foundation, Royal DSM[1], and the Global Alliance for Improved Nutrition (GAIN) hosted a panel called "The Need for Transformational Dietary Shifts: How to Nudge Consumer Preference towards Healthy and Sustainable Diets" (WBCSD 2018b). According to the WBCSD, this was "*THE* food-related event" at the forum, demonstrating a rapidly growing interest in the idea of 'sustainable diets' by a variety of actors, including the largest transnational food and beverage corporations, commonly referred to as Big Food (WBCSD 2018b).[2]

The interest in sustainable diets as a concept results from first and foremost a growing awareness and acceptance that the food system as it currently functions is unsustainable. A wide variety of assessments from diverse disciplinary and political viewpoints call for transformation of the food system (Caron et al. 2018; Springmann et al. 2018; Swinburn et al. 2019; IPES-Food 2016, 2017; IFPRI 2018). Responding to these broad calls for change in the food system requires varied policies and governance mechanisms. Sustainable diets have been put forward as one such solution, developing out of a growing awareness that dietary choices are directly linked to sustainability challenges in the food system, now and into the future (Mason and Lang 2017; Willett et al. 2019). Academia, public policy circles and non-governmental advocacy organizations have amplified discourse around the question of how to shift diets to make them more sustainable, focusing on clarifying, quantifying and prioritizing what a sustainable and healthy diet is and how we get there (Ranganathan et al. 2016; Mason and Lang 2017).

[1] The World Economic Forum is an international organization for public-private cooperation with a mission to drive new agendas and align them across countries and industries (World Economic Forum 2018). The World Business Council for Sustainable Development is a CEO-led organization of 200 member companies who work together to "accelerate the transition to a sustainable world" (WBCSD 2018a). The EAT Foundation is a non-profit focused on "transforming our global food system through sound science, impatient disruption and novel partnerships." (EAT Foundation 2018a). Royal DSM is a science-based Dutch multinational focused on health, nutrition, and sustainable living. The Global Alliance for Improved Nutrition (GAIN) is a non-profit that was developed by the UN in 2002 to work in partnerships to make healthier food choices "more affordable, more available, and more desirable" (GAIN 2018).

[2] For the purposes of this work, Big Food is defined as the largest transnational food and beverage manufacturers, however, the focus of this research is on the largest eleven companies.

To date, the sustainable diets literature has largely focused on meat and dairy and individual dietary change. Yet, research continues to show the spread of a nutrition transition that has led to a growing consumption of animal products and ultra-processed foods – formulations of industrial ingredients made to be convenient, ready-to-eat, palatable and profitable (Monteiro et al. 2013; Prentice 2009). Ultra-processed foods have been understudied in the literature on sustainable diets, despite being identified as a driver of both health and sustainability challenges in the food system (Swinburn et al. 2019; IPES-Food 2017).

Makers of ultra-processed foods – Big Food companies – have played a documented role in shaping the world food system, influencing diets globally, and promoting consumption of these products (Monteiro et al. 2013; Moodie et al. 2013; Baker and Friel 2016; Prentice 2009). Much of the research on these firms thus far has focused on their role in promoting diets that are unhealthy which has prompted calls for food system change (Moubarac 2017; Baker and Friel 2016; Swinburn et al. 2019). Despite calls for change in the food system on one hand and the sustainable diets concept gaining traction on the other hand, few studies within the sustainable diets literature have focused on the impact of ultra-processed foods, and even fewer have looked beyond these products to their makers – Big Food. As a result, there is comparatively little research that has examined the *sustainability* activities of Big Food as they relate to sustainable diets.

This dearth of academic attention is somewhat puzzling, especially given that Big Food companies clearly see their role in these debates. Firms' engagement with these issues is evidenced by the fact that they are increasingly framing themselves as legitimate actors in the future of sustainable and healthy food systems and diets by claiming that their sustainability initiatives contribute to the delivery of adequate and nutritious food to all in an environmentally-friendly manner. In other words, these firms are making legitimacy claims in public statements that effectively assert not only that they have a legitimate role as actors to tackle the problems of an unsustainable food system, but also that their own efforts are making a difference (Jha, Kozhevnikov, and Liu 2018; Miller 2008; Bebbington, Larrinaga, and Moneva 2008; Palazzo and Scherer 2006; Scherer, Palazzo, and Seidl 2013; Breeze 2012). These claims include declarations, such as, "feeding 9 billion people in 2050 isn't an unachievable dream. …it's

possible to make food and beverages that meet not only the nutritional challenges, but the environmental, economic and social ones as well" (Danone 2017, 10), or General Mills' claim that, "We're facing unprecedented change in our industry and on our planet, and expectations of food companies have never been higher. This [change] requires transformation at every level, from how we source ingredients to how we make our products to how we engage with our consumers." (General Mills, 2018, 1). These examples of sentiments expressed by the Big Food firms illustrate how these companies envision their evolving role[3].

This puzzle – that the sustainable diets literature has not yet focused on Big Food companies, yet those firms are nonetheless making legitimacy claims about their contribution to more sustainable food systems – provides the impetus for this study, which examines the sustainability strategies of Big Food corporations in the setting of increasing and contentious debates on sustainable diets. In particular, this work seeks to explain how it is that these firms have been able to make legitimacy claims within the broader debates on sustainability and sustainable diets in the food system. Using an analytical framework that characterizes key political and economic features of the global agrifood landscape that matter for sustainability governance – complex and distanced supply chains, weak and fragmented governance initiatives, polarized ideational debates, and uneven power dynamics (Clapp and Scott 2018) – the thesis shows how firms are able to navigate the agrifood landscape in ways that enable them to make legitimacy claims and position themselves as taking bold action.

While no concept of food system sustainability provides all the answers and solutions to the many environmental, health and social challenges associated with the food system, the current governance landscape, in conjunction with the discourses of sustainable diets that have emerged, warrant consideration. Particularly, we should pause to consider the role of corporate actors in food system sustainability, and the implications of their strategies for sustainable and healthy food systems of the future and the policy that is used to move forward on that agenda. This thesis uses a conceptual framework drawing on political economy of food systems to help clarify how the sustainability efforts of Big Food firms in the context of current governance and sustainable

[3] Further examples of these types of claims will be explored in Chapter 3.

eating debates tend to serve certain interests and may limit our ability to not only achieve sustainable diets but to imagine a different kind of sustainable food future.

1.1 Objectives and Research Questions

This thesis has four objectives. The first objective is to understand the key debates and discourses on sustainable diets. The second objective is used to contextualize these debates by describing the current global food landscape characteristics that influence environmental politics in which legitimacy claims of Big Food are occurring. The third objective is to examine the Big Food sustainability strategies that have the greatest impact on the ways that sustainable diets debates are conceptualized. Finally, this work aims to evaluate the implications of how these sustainability strategies are articulated in the current governance and sustainable diets discourse environment.

To meet these objectives, this work considers three related questions. The first question is **empirical** and examines the ways that Big Food companies are approaching their sustainability strategies in order to frame themselves as legitimate. The second question uses **theoretical** explanations arising from global food and environmental governance to understand factors that impact companies choice of sustainability strategies and how these strategies enable companies to make legitimacy claims about their role in the food system. The final question concentrates on the **policy** implications for sustainable diets.

1. What sustainability strategies are Big Food companies pursuing to claim legitimacy?
2. How do insights from the literature on the global governance of food and the environment help us understand Big Food companies' choice of sustainability strategies?
3. What are the policy implications of Big Food sustainability strategies for achieving sustainable diets?

1.2 Summary of Conclusions and Contributions

This study is intended to provide new empirical insights into the global political economy of food by focusing attention on Big Food as manufacturers of ultra-processed food products. Very

little research has closely examined the way that Big Food has characterized their sustainability in the context of sustainable diets. In particular, no work has examined how the sustainability strategies of these corporations are being linked to their legitimacy claims. To address this gap, this thesis first establishes that all of the Big Food companies, regardless of their level of engagement on issues of sustainability, use their corporate sustainability work to make legitimacy claims about their role in the food system. These legitimacy claims do not guarantee that others will see a corporation as legitimate. Importantly for this thesis, legitimacy is seen as fluid and relational: a constantly evolving endeavour in which context is especially relevant and legitimacy is always contested (Miller 2008). The thesis does not attempt to decide whether or not an actor is seen as legitimate, but rather what might enable them to frame themselves as legitimate.

This thesis then answers the first research question by establishing three sustainability strategies that underpin the legitimacy claims of Big Food and are important for the way sustainable diets are discussed and the policy proposals that then become relevant. The focus on these three strategies was determined based on the themes that emerged during the analysis done in the first cycle of coding and excludes the wide variety of activities that fall under the umbrella of efficiency and production improvements[4]. These three sustainability strategies were chosen based on their relevance for the conception of sustainable diets and their prominence in corporate documentation. The strategies examined are: 1) how sustainability gets measured, 2) sustainable sourcing, and 3) product-portfolio changes that are being used by companies to promote 'healthier and more sustainable diets'.

The new empirical insights on Big Food sustainability strategies provided in the substantive chapters of this thesis will be useful to those studying food governance and environmental governance. This thesis will add theoretical insights by applying the analytical framework originally published as an introduction to a special issue in *Global Environmental Politics* to add to our understanding of legitimacy (Clapp and Scott 2018). This analytical framework outlines four key features of the global agrifood landscape that can help to explain why the global

[4] The process of deciding which sustainability strategies to examine for this thesis is further clarified in section 1.4.2 Data Analysis, First Cycle Coding.

environmental politics of food is so fraught. These features are complex and distanced supply chains, weak and fragmented governance initiatives, polarized ideational debates, and uneven power dynamics (Clapp and Scott 2018). This thesis applies this conceptual framework to examine legitimacy in the context of sustainability debates in the food system, given the prominence of legitimacy claims by Big Food companies. By using political and economic features of the agrifood landscape to study legitimacy it becomes clear how firms are able to navigate the landscape using their sustainability strategies and the discursive practices around those strategies to frame themselves as legitimate actors taking bold actions.

The research will utilize this conceptual framework to explain how space is created for companies to articulate their various sustainability strategies which they use as a means to claim legitimacy in numerous ways. First, this thesis will examine the ways in which Big Food firms seek to "scientize"[5] data in their sustainability strategies. This type of strategy is evident in their claims to legitimacy, which appeal to objectivity and allow companies to validate progress, while utilizing a narrow vision of sustainability. Second, this work will assess the ways in which Big Food companies employ sustainable sourcing strategies as another way that they seek to establish their legitimacy. The analysis shows that such an approach offers a wide variety of sourcing initiatives that effectively create space for corporate actors to focus narrowly on certain aspects of sustainability over others. Finally, the thesis provides an examination of product-portfolio management as a third key sustainability strategy pursued by Big Food firms. The analysis reveals how this practice is often used by Big Food companies to show that they are introducing new products that meet sustainability criteria that they themselves have established, while at the same time shifting the focus onto consumer choice as a key site of action on sustainable diets.

Finally, the implications for policy on sustainable diets will be illuminated. This study will provide a new understanding of the ways that corporate sustainability strategies fail to meet more progressive visions of sustainable diets that have been set out by the FAO, Bioversity International, and scholars such as Mason and Lang (2017). Debates around sustainable diets

[5] For the purposes of this work, the terms 'scientized' or 'scientization' are meant to elicit an attempt to make debates about the nature of sustainability strategies an apolitical discussion amongst scientists (Kinchy 2012)

have largely focused on how to make them a policy priority and how to measure them and ensure health (Scarborough et al. 2012; Springmann, Godfray, et al. 2016; Tilman and Clark 2014) (explored further in Chapter 2). As an alternative approach, this work accepts the concept of sustainable diets as useful but will problematize it to understand how major players shaping the food system can use it to their advantage in making legitimacy claims. The core of this work arises from differentiating between the original *intention* of sustainable diets put forward by the FAO and academics such as, Mason and Lang (2017), and the *interpretation* of the concept by a variety of actors, and in particular, Big Food.

Based on the research and analysis, this thesis arrives at three connected conclusions. First, it argues that the context of the current agrifood landscape features and sustainable diets debates has created an environment in which Big Food is able to more easily claim legitimacy. Firms frame themselves as legitimate by pursuing sustainability initiatives that are narrow and specific, while leaving out certain aspects important to future food security and sustainability and the holistic vision that is required to get there. At the same time, these strategies tend to separate health efforts from environmental efforts, despite their interconnected nature. The narrowed vision of sustainability subverts a more progressive or holistic "sustainable diets" discourse where broader structures that determine diets are the focus. Many advocates of the term 'sustainable diets' explicitly conceptualize the environmental and health aspects of the concept to be inseparable, and this more holistic framing has become the focus of new work that explores systemic drivers of negative health and ecological outcomes in the food system (IPES-Food 2017b; Mason and Lang 2017; Swinburn et al. 2019; Willett et al. 2019). Simultaneously, restricted definitions of sustainability may obfuscate problematic aspects of the current food system, Big Food's role in that system, and the place of ultra-processed foods within diets. Big Food companies, whether intentionally or not, take advantage of the features of the current global food and environmental governance landscape to perpetuate these sustainability definitions.

Second, the four outlined political and economic features of the current global food landscape, along with certain elements of the way that sustainable diets are being interpreted, contribute to the ways that firms' legitimacy claims can be made, opening opportunities for corporate actors to

try position themselves as legitimate actors in addressing the sustainability dilemmas associated with the current food system. Companies may take advantage of uneven power dynamics and ideational debates to define sustainability in particular ways, which is then spread through weak and fragmented governance mechanisms that are hard to monitor given the complexity and distance in the food system.

Finally, all together, the sustainability strategies pursued by Big Food companies are essential ways for these firms to attempt to protect their growth and mitigate risk. They pursue this risk mitigation by implicitly downloading responsibility for change onto other actors and reinforcing the inclusion of ultra-processed foods in product lines – typically the most profitable for Big Food. The sustainability strategies examined in this research serve to minimize a variety of risks related to sourcing ingredients; reporting to governments, retailers and consumers; controlling suppliers; responding to shifting consumer demands; marketing; and avoiding regulatory or civil society action. Additionally, these sustainability strategies help companies shift the focus to consumers – placing consumers at the "beginning of the food value chain" rather than the end (WBCSD et al. 2018). By focusing on consumers as the starting point to the value chain, companies can individualize responsibility, while stigmatizing consumers who do not "do their part", taking the focus away from systemic solutions to food system sustainability.

1.3 Research Context and Rationale

There is an ongoing debate over what exactly constitutes a healthy diet, with perceptions and reporting on nutrition science making it appear ever-evolving. There is also debate over the focus on diets over other social determinants of health (eg. poverty, housing, work conditions, access to healthcare) despite contestation by scholars in public health (Korp, 2010; Marmot and Wilkinson, 2005). Similarly, the concept of a healthy food system is highly disputed with a variety of factors to potentially consider (Chaudhary, Gustafson, and Mathys 2018; Gillespie and Bold 2017; Hamm 2009; Wallinga 2009) (explored more in Chapter 2). However, some scholars make the case that diets beneficial to health, and food systems that contribute to providing these diets, are co-dependent, in a way that has only now been recognized more broadly (Dangour, Mace, and Shankar 2017; Hawkes and Popkin 2015; Kennedy, Kershaw, and Coates 2018;

Meybeck and Gitz 2017, Willett et al. 2019). A recent report[6] identified understanding the complex ways that diets and the sustainability of the food system interact in a holistic transdisciplinary way as a leverage point for addressing food system issues (IPES-Food 2017b). This thesis explores a narrow facet of the food system sustainability challenge by focusing on corporate actors, ultra-processed foods and governance around debates on sustainable eating. However, this work attempts to carefully consider these broader issues, understanding the complexity with which the system is shaped.

The starting point for this research arises from the numerous signs of social and ecological weakness in the global food system. This thesis takes a broad definition of sustainability in the food system, capturing the environmental, health, cultural, and economic aspects that shape dietary patterns. However, the focus of this work is most often at the intersection of environment and health. It thus focuses attention on Big Food Corporations, defined as "transnational food and beverage manufacturing corporations that increasingly control the production and distribution of ultra-processed food products globally" (Monteiro and Cannon 2012, 2). The reason for focusing on these corporations is their major role in the global dissemination of ultra-processed foods and the health and ecological consequences associated with these foods, as noted above and expanded on below.

1.3.1 Food System Sustainability in Question

Environmental Sustainability

The global food crisis in 2008 marked a turning point for awareness of the interconnections between the food system and the environment (Rosin, Stock, and Campbell 2013; Lang 2010). The industrial production of food, along with its distribution, storage, transportation, consumption and loss are major contributors to the use of water and fossil fuel energy. At the same time, this food system contributes to the linked issues of climate change, deforestation,

[6] *Unraveling the Food-Health Nexus: Addressing practices, political economy, and power relations to build healthier food systems*

biodiversity loss, soil erosion, the use of chemicals, and depletion of fisheries. The industrial food system, which relies on simplification and standardization, has led to 'biophysical overrides' or 'perpetual short-term fixes' used by farmers to combat the environmental results of a system that then threatens the very foundations on which it depends (Weis 2010, 319).

The ecological crisis is backed by consistently expanding empirical data and studies from the scientific community. The immense energy load required for, and resulting emissions from, industrial agricultural operations, are most often estimated to contribute between 15-32% of global greenhouse gas emissions (Niles et al., 2017; Smith and Gregory, 2013; Vermeulen et al., 2012). Agricultural emissions from methane and nitrous oxide are expected to grow by another 35-50% by 2050 from fertilizer use and livestock production (supported by emission intensive monoculture production systems) (FAO 2002; Weis, 2013; Pimentel and Pimentel, 2003; FAO, 2006). The food system can play a significant role in meeting carbon emissions reductions that are critically needed, given acknowledgement that emissions are growing faster than ever and we are far from targets set out in the Paris Agreement (UNEP 2017). Air quality is also impacted by criteria air pollutants resulting from the food sector, creating unpleasant smell-scapes (Weis 2013a; Heller and Keoleian 2003) as well as the atmospheric deposition of pesticides causing significant health problems in humans and animals (Miller et al., 2000; IPES-Food, 2017a).

Simultaneously, accelerated soil erosion and degradation continue (McIntyre et al., 2009, Lal 2003), and intensive water use and pollution from run off are features of this system (Jägerskog and Clausen, 2012; Heller and Keoleian, 2003). Additionally, biodiversity loss is being exacerbated by land use change, pollution and increasingly small pools of genetic resources promoted by large monoculture operations (Burlingame and Dernini 2012; Crist, Mora, and Engelman 2017; Jacques and Jacques 2012; Wilting et al. 2017). According to the Food and Agriculture Organization of the United Nations (FAO), globally, 75% of crop genetic diversity was lost between 1900 and 2000 (FAO 2010). In livestock, only 15 mammal and bird species now account for 90% of animal agriculture (Mooney 2015). Although some scholars contest these figures, it is nevertheless certain that biodiversity loss is a pressing negative outcome of industrial farming practices (Dempsey 2013; Montenegro de Wit 2016).

Beyond agricultural production, there continue to be environmental issues throughout the food supply chain. Food processing features higher water and energy use, and produces more waste than unprocessed or minimally processed foods (Mishra et al. 2012; Murphy et al 2014). Packaging has led to a plastic pollution crisis that is receiving increasing attention globally, while at the same time leading to toxicity issues from endocrine disrupting chemicals – now agreed to be obesogens (Leonard 2018; Rudel et al. 2011; Schecter et al. 2013; Trasande 2017). Heavy energy demands also come from the cold chain and cultural norms that have created high refrigeration demand (Garnett 2007; Sage 2011, 172-173). These environmental outcomes associated with the industrial food system threaten our future ability to feed populations, live in clean environments, and access clean water.

Health and Dietary Sustainability

Coinciding with the increasing awareness of the environmental outcomes of industrial food production is growing cognizance of the health outcomes that result from this food system. While a variety of negative health concerns, from toxic pesticide exposure, to food safety issues, result from the food system, it is food insecurity and poor diets that result in the most deaths from the food system, and the greatest cost to society (IPES-Food 2017b). Roughly 821 million people remain undernourished, unable to meet the caloric needs required to live a sedentary life for at least one year (FAO et al. 2018). Simultaneously, roughly 2 billion people are affected by overweight and obesity resulting in part from overconsumption of calories linked to diets of increased fat, sugar, salt, and animal food (FAO et al. 2017). An increased incidence of non-communicable diseases is often associated with poor diets (FAO et al. 2017). There are also estimates that approximately 2 billion people suffer from micronutrient deficiencies from diets that do not provide adequate diversity and nutrition (FAO et al. 2017). Additionally, there is overlap between these categories, and food insecurity has also been shown to potentially contribute to overweight and obesity (FAO et al. 2018). However, the literature on this is still in its infancy and contested (Institute of Medicine 2011).

This paradox of simultaneous over- and under-nutrition and micronutrient-deficient diets is termed the triple-burden of malnutrition and is increasingly the norm throughout the world. Part of this triple burden results from the ‘nutrition transition’, a trend documented over the last two

decades by a number of nutrition experts, characterized by a major shift in diets throughout the world. Increasingly, diets feature high consumption of animal products and ultra-processed foods, with rising sugar and fat intake and the omission of whole grains, fruits and vegetables as a result (Popkin et al., 2012). It is this nutrition transition, and the resulting dietary patterns of increased meat, dairy and eggs that have been identified by many as putting increasing strain on the environment, and are the basis of calls for expanded food production to ensure that predicted food needs are met into the future (FAO 2018; Weis 2013a). A variety of scholars, shown above, have focused on issues of production and distribution in the food system that lead to adverse environmental outcomes, but recently, there has been a turn to focus on consumption through the concept of sustainable diets.

Sustainable Diets

The term 'sustainable diets' has often been tied to Gussow and Clancy (1986), who used it to call for a better integration of sustainability into dietary guidelines. The appeals for expanded food production assume a continuation of trends where emerging economies transition to 'Westernized' diets with larger amounts of meat, dairy, eggs and processed foods – making the concept of sustainable diets all the more important to reduce this burden on the environment (Popkin, 2016). A broad definition for sustainable diets was popularized by an FAO scientific panel as,

> Diets with low environmental impacts, which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources. (Burlingame and Dernini, 2012, 2).

Notably, the original intention of the sustainable diets concept is summarized in the Final Report of the International Scientific Symposium, the report that led to the definition of the term. The report shows that the authors and symposium participants envisioned sustainable diets as bringing attention to a more holistic and integrative approach to food system sustainability.

> Sustainable diets as a model will foster a broader consensus for action in agriculture, to improve nutrition through an ecosystem approach. It will serve to raise awareness among the public and governments on food systems' sustainability, including sustainable production intensification. Sustainable diets, as a goal, will lead to broader scientific, social and political recognition that the health of humans cannot be isolated from the health of ecosystems (Burlingame 2011, iii).

The intention behind sustainable diets is a different way to approach the food system to cultivate holistic consensus on key environmental and health issues. However, the official definition that arose from the Symposium raises important questions, such as: What is considered a "low environmental impact"? Who decides what is considered nutritious, or a "healthy life"? How do we optimize natural and human resources? And, by what standard? These questions have given rise to a growing body of literature that attempts to operationalize sustainable diets. While the definition remains unrefined, it has meant increased acknowledgement among academics, non-profits, some governments and individuals, that consumption choices have impacts and that strategies for shifting consumption may be necessary (Tilman and Clark 2014; Mason and Lang 2017). Overall, the literature on sustainable diets has provided a good indication of the environmental impacts of meat, eggs, and dairy in dietary choice (see Jones et al. 2016 for an overview) but has left out other aspects of the definition including economic fairness, affordability, or cultural appropriateness (Johnston et al. 2014). Additionally, most work on sustainable diets has concentrated on developed countries, a handful of environmental issues and products, while reducing complexity around overall diet quality and environmental impact (Garnett, Roos, and Little 2015). A detailed literature review of sustainable diets will be provided in Chapter 2. However, the importance of the concept of sustainable diets to this study lies in the intersecting challenge of environment and health that is increasingly evident as a result of the least sustainable aspects of diets (Springmann, Mason-D'Croz, et al. 2016; Scarborough et al. 2012).

1.3.2 Big Food Corporations and Ultra-Processed Foods

Big Food corporations that make ultra-processed foods have significant influence in shaping the food system through price-setting, lobbying, private-standard setting, and shaping public debate (see Clapp 2016, Chapter 4). The top ten public Big Food firms had combined sales of US$365.7 billion in 2017, with the top three, Nestlé, Unilever and Pepsi representing 59% of the sales of public companies in the top ten (Forbes 2018b). Mars, a private company, without the same reporting requirements, had sales of roughly $35 billion for fiscal year 2017 (Forbes 2018a).

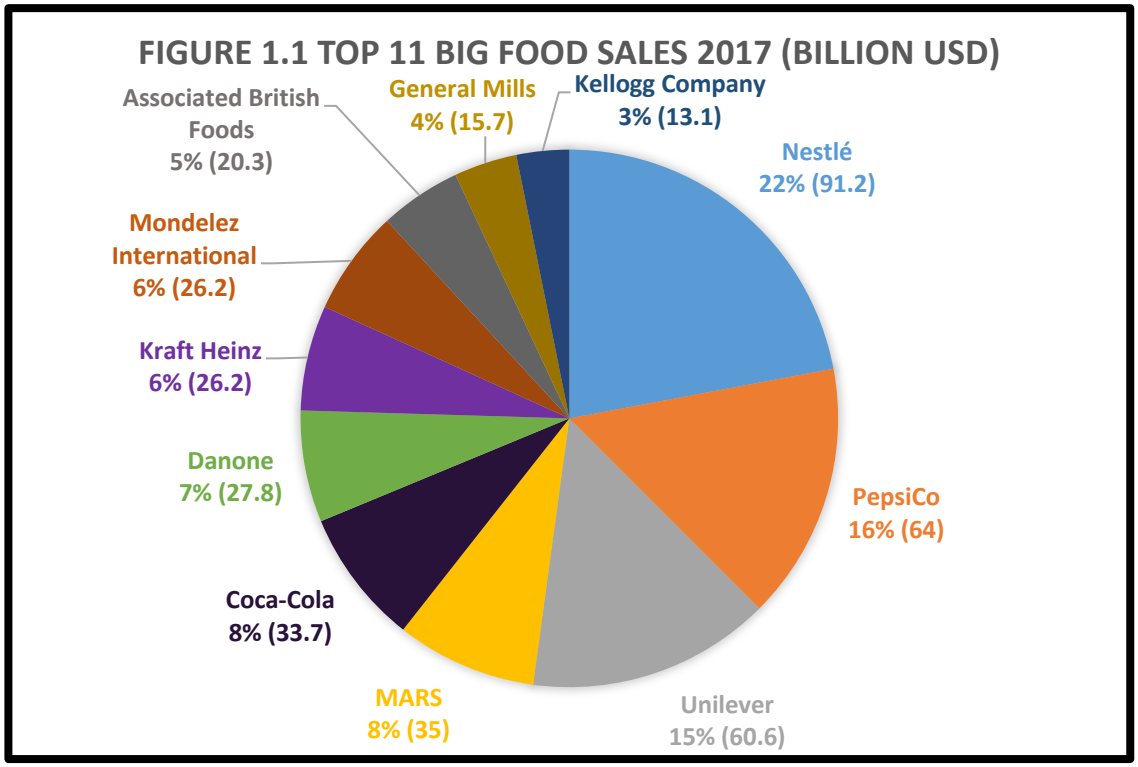

Figure 1.1 and Table 1.1 (below) show all eleven companies, with sales figures for comparison. In the context of the estimated $8.1 trillion total value of the global food and agricultural industry, these companies make up a fairly small amount, but this number is still significant given that it represents just 11 companies (Plunkett Research 2015, cited in Clapp 2016, 147).

Competition in this sector is very high, with efforts made to come up with the next innovation, capture the next market, and outgrow competitors. Big Food firms are the focus of this study, given their role in producing ultra-processed food products, but more importantly, given their role in spreading these products globally and in maintaining and expanding their systems of supply chains. Companies like Nestlé, Mondelēz and General Mills have been open about their intention to increase the consumption of their products globally, concentrating efforts on lower- and middle-income countries where consumption is expanding (Jacobs and Richtel 2017). The expansion of these products threatens to compound health issues related to diets high in ultra-processed foods. At the same time, Big Food has begun to pay attention to sustainability, with a wide array of efforts meant to make their supply chains more transparent and sustainable, and in turn, their end products perceived as such.

The intersection of health and environmental issues is at the center of sustainable diets, as many of the same foods, including meat and ultra-processed products, correlated with negative health outcomes, are the same foods that have a heavy environmental toll (Hadjikakou 2017; Hendrie et al. 2016; Scarborough et al. 2012; Springmann, Mason-D'Croz, et al. 2016). This reality presents new challenges to the growth of Big Food, compounded by changing consumer trends and slowing economic growth. There is also a growing challenge from smaller, locally-owned, and premium brands, that are outperforming multinationals, making acquisitions and takeovers an emergent trend (Hosafci 2017). Indeed, mergers and acquisitions have proven a successful profit and growth strategy for some brands and industries. Danone had rapid 2017 sales growth compared with its peers, while acquiring a leading milk alternatives company, WhiteWave, early in the year (Hosafci 2017). While Danone outperformed its competitors in economic terms, the industry as a whole has received mounting pressure from consumers and non-profits to improve on a variety of sustainability and social issues, many of which Big Food has struggled to deal with effectively (Freidberg 2017b).

Currently, little of the sustainable diets literature focuses specifically on ultra-processed foods, despite these foods being responsible for an estimated one-third of the environmental impact of diets, when CO2-e, and land, water, and energy use are the considered indicators (Hadjikakou 2017). Other studies have similarly shown these food formulations to have higher environmental impacts when compared to less processed options (Nilsson, et al. 2011; Schmidt Rivera, et al. 2014). Another study highlighted the contribution of "junk foods" to the CO_2 emissions that come from diets, showing that they make a contribution similar to red meat (Hendrie et al. 2014). However, Hadjikakou (2017) argues that not enough attention has been paid to reducing consumption of "discretionary foods"[7], leading to a significant gap in the literature with respect to quantifying their impacts and measuring the trade-offs and differences. Despite little work on the environmental impacts of ultra-processed foods, evidence is growing on their increasing consumption globally. The rate of consumption of these foods has been growing in recent decades. In some areas, consumption is very high, up to 60% of diets (Monteiro et al. 2017;

[7] Discretionary foods are foods that are unnecessary to meeting dietary needs. The term would refer to foods that are largely considered in the ultra-processed foods category.

Monteiro et al. 2013; Moubarac et al. 2014; Baker and Friel 2016; Juul and Hemmingsson 2015). These products are also experiencing rapid consumption growth in middle-income countries with annual growth rates higher than 5%, and even up to 10% in several lower- and upper-middle income countries. In contrast, consumption growth is stagnant or declining in Western Europe and North America (Monteiro et al. 2013, pg. 14; van den Bos 2017). These foods have also been the subject of a variety of studies demonstrating that they are unnecessary to meet dietary needs, provide few nutrients, tend to encourage overeating, and are associated with increased detrimental health impacts (Fardet 2016; Fiolet et al. 2018; Hall 2019; Hendrie et al. 2016; Louzada et al. 2015; Luiten et al. 2016).

Monteiro et al. (2013) conclude that food and beverage manufacturers, along with retailers and fast food corporations, are playing a prominent role in shaping the global food system. Baker and Friel (2016) come to similar conclusions when focusing specifically on Asian markets. They found that food and beverage manufacturers have focused on the least healthy ultra-processed foods as they enter lower-and-middle-income countries, by heavily promoting soft drinks, snack foods, and cookies (Baker and Friel, 2016). These efforts have meant that although they remain relatively small in the overall market in this region, these companies have higher market concentration and power in the least-healthy food categories. In other words, while the saturated markets of high-income countries leave fewer opportunities for growth, low- and middle-income countries provide new prospects, particularly in the sale of the least healthy product categories. The nutrition transition is spreading diets high in salt, sugar, fat, meat and dairy globally, and the food industry is a major player in this shift (Popkin, Adair, and Ng 2012; Popkin and Kenan 2016). These trends represent a significant challenge for public health, as the nutrition transition to diets high in junk foods has substantial associations with non-communicable diseases (NCDs) and diets notable for decreased micronutrient contents and increased added sugars (Prentice 2009; Moubarac et al. 2017; Mendonça et al. 2016; Steele et al. 2016; Rauber et al. 2015; Louzada et al. 2015). These trends also challenge the legitimacy claims of corporate actors as part of the solution to achieving healthier and more sustainable diets.

1.4 Methodology and Research Design

This work employs a critical political economy approach to gain a comprehensive understanding of the activities of Big Food, and their potential outcomes for food security and sustainability. This work is post-positivist and has an interpretive epistemological starting point. Thus, it does not claim uncontested certainty and understands that interpretations of reality are culturally derived and historically situated (Scotland 2012; Moon and Blackman 2014). This work conducted at another time, or by another person with a different epistemological position, may well look very different. At the same time, there is obviously a potential for bias in a study such as this: the normative starting point accepts the vast scholarly literature that has found substantial environmental and health issues related to the current industrial food system and argues for fundamental change to the way food is produced. However, how that change will occur and which actors will drive it was not assumed throughout the research, and is not a conclusion of this study. In other words, corporate actors may very well play a positive role in the future of the food system, but their discourse and actions warrant attention and comparison against a variety of perspectives on food system and dietary sustainability.

Every effort has been made to avoid biased assumptions about the outcomes of the sustainability strategies explored, and to investigate different perspectives on the activities of Big Food corporations. This work does not deny that progress is being made, with companies creating ambitious goals and showing progress against them in their CSR reports and on their websites. In using a critical political economy approach, I have attempted to step back and assess the implications of the findings through questions that do not assume the answer but seek better understanding of the way things are. The critical political economy of food systems approach used for this study draws from diverse liberal and critical international relations and international political economy traditions. This is differentiated from a critical political economy of food approach in the Marxist food studies tradition, which has a higher-level focus on food in the context of historical political and economic events and the evolution of capitalism, accumulation, and institutional organization (eg. Friedmann, 1993; Friedmann and McMichael, 1989). To engage at the more granular level of corporate policies and sustainability reports, an approach that draws from liberal and critical international political economy is most appropriate for this study.

Political economy approaches take a broad view, engaging with a variety of disciplines. Critical political economy tends to problematize the status quo and ask questions about why structures are organized as they are, who was part of establishing them in this way, and how these structures benefit certain actors more than others (Lipschutz 2010). Critical political economy approaches are significant for understanding "the complexities and contradictions of the global economy" and are differentiated by moving beyond traditional state-centric and econometric understandings of these phenomena (Cohen 2008; Jäger, Horn, and Becker 2016; Worth 2011). Institutions, ideas, and power relations evolving over time become the focus of inquiry (Cox 1981). In particular, this approach enables an "understand[ing of] the processes of change in which both parts and whole are involved" (Cox, 1981, 129).

Focusing on food, these methods necessitate questioning how priorities in the food system are set and who makes decisions; how our knowledge of these impacts is shaped; and why evidence gaps exist while impacts are systematically reproduced (IPES-Food, 2017b, 10). Most critically, a critical political economy approach to this work enables increased understanding of why certain problems are not politically prioritized as they are increasingly documented (IPES-Food, 2017b). Political economy approaches to food are particularly pertinent to studying corporate actors to assess their power, which can help us understand their role in shaping food system governance, and its outcomes (Clapp and Fuchs 2009; Howard, Goodman, and Goodman 2016).

Answering political economy questions requires a focus on power, using conceptions of power consistent with methods in this field (Clapp and Fuchs 2009; Fuchs and Glaab 2011; Fuchs et al. 2016). The analytical framework established in Chapter 3 is used to understand and contextualize the sustainability activities that relate to sustainable diets. Fine (1998, 32) highlights the importance of a political economy approach in examining food consumption, stating that it sheds light on "deficiencies in the treatment of consumption within orthodox approaches". He argues that orthodox approaches to understanding consumption through economics and consumer behavior studies tend to limit scope, rationalize actors, or appeal to the irrationality of preferences when rational reasons break down (Fine 1998). In doing so, traditional approaches to understanding consumption tend to miss the complexity that is evident with a broader look at the political and economic dynamics that shape consumption.

This study examines the largest of the Big Food corporations (Table 1.1) based on the Forbes List of the World's Largest Companies, which uses, "a composite score from equally-weighted measures of revenue, profits, assets and market value" (Schaefer 2016). At the start of this study, Kraft Heinz was not included. The company resulted from a 2015 merger between Kraft and Heinz, making it one of the top ten food and beverage manufacturers by size. However, there was little to report on, as the company did not issue a sustainability report for several years after merging. As such, Kellogg Company (also referred to as Kellogg) was originally added as the tenth company on the list. This was consistent with the top ten companies targeted by the Oxfam Behind the Brands campaign which explored issues in this sector (Oxfam 2013). In 2017, Kraft Heinz issued a sustainability report, and including it as part of the study provides an interesting case, as the merger and takeover by an asset management company has made the company very driven and committed to profits, a goal other companies have struggled with in recent years (Demeritt et al. n.d.; Kowitt 2015).

Table 1.1 Eleven Big Food Companies Covered by this Thesis

Company	2017 Sales (billion USD)
Associated British Foods	20.3
The Coca-Cola Company	33.7
Danone	27.8
General Mills	15.7
Kellogg Company	13.1
Kraft Heinz	26.2
Mars Inc.	35
Mondelēz International	26.2
Nestlé	91.2
PepsiCo	64
Unilever	60.6

1.4.1 Data Collection

Document Collection

Documents formed the primary source of data for this study. This was the best method for this study given that the theoretical analysis was largely discursive, focusing on the language and discourse used by corporations in their efforts to present their sustainability and investment strategies to their investors and other stakeholders. A wide variety of documents were collected for analysis. This was an ongoing and iterative process throughout the research between 2014

and 2018. Table 1.2 provides a list of the types and number of documents collected and analyzed. The types of documents to be collected was informed by Mialon et al. (2015), who developed a framework for studying corporate political activity in the food sector and created a list of potential documents to examine. This list includes the main categories listed in Table 1.2. The list of subcategories was adjusted based on the study, as this work was focused more on sustainability, while Mialon et al. (2015) focused primarily on health-related activities of Big Food.

The list of documents includes both documents analyzed using coding in NVivo as well as those that were not coded in NVivo but were used to find a specific piece of information, or added additional insights based on the findings of the coding. The primary documents that were coded included available company sustainability reports from 2008-2018, company sustainability policies and white papers, and investor relations documents such as presentations, and reports to investors. Coding analysis was also conducted on a number of multi-stakeholder initiative and non-governmental organization (NGO) reports. The documents that were not coded and analyzed in NVivo tended to be more specific in nature. These included webpages of industry actors that focused on a specific issue. For example, Nestlé's web page on plant science, or Unilever's page on life cycle assessment. Other examples in this category include social media pages or press releases. News and industry news websites were also not coded but rather add to the details of the thesis. Documents that were not analyzed in NVivo provide additional insights into how companies and their representatives are actively articulating their sustainability strategies on a day-to-day basis. A full list of documents can be found in Appendix A.

Documents were collected under each category using the list from Mialon et al. (2015) as a starting point. In the industry category, all documents available on Big Food company websites during the research period were collected and analyzed. This meant going to company websites regularly to check for the latest policy documents, CSR reports, and investor presentations. Additionally, "Google Alerts" were used to track the companies over the research period, and follow up on relevant news items, and press releases related to their sustainability strategies. The eleven Big Food companies that were the focus of this study had varying levels of transparency and documentation available. For example, Nestlé has a vast document library with a wide

variety of policies, reports, and presentations. Conversely, Kraft Heinz has very few policy documents and reports to download its site, instead having a few short write ups on certain issues, including animal welfare and palm oil. More available documentation meant that some companies were the focus of the study more than others in some chapters due to the information that was accessible.

For the other categories of documents, including government, academic, non-profit, and "other", the search strategy unfolded in a few different ways. First, a variety of search terms were used to generate sources related to the sustainability strategies that were the focus of the research. This included starting broadly with search terms such as, "sustainable sourcing" or "life cycle assessment", plus the name of a particular Big Food company or food and beverage manufacturing more broadly. This type of search strategy was used to find other sources of information on how these companies are perceived, or other actors that may influence the way these sustainability strategies are articulated. Second, a narrower search strategy was used to find information on related initiatives or developments. For example, Food Reform for Sustainability and Health (FReSH) emerged as a new initiative during the research period, with many Big Food companies involved. Research was then conducted to find as much information on this initiative as possible, and to continue to follow developments on this initiative as it evolved. Another example of where this type of search would be used would be where an initiative was mentioned by multiple companies, and then research was conducted to find out more about that initiative. The Science-Based Targets initiative emerged as a commonality amongst many companies, and thus more information and documentation was collected to more fully understand this initiative, where it came from, and how it was influencing climate policy for these companies.

Table 1.2: Documents Analysed

Source	Document Details/ Sources of Information	#
Industry – The top 11 and their Venture Capital Firms	Webpage of industry actor	45
	CSR/ Annual Report	55
	Policy documents, guidelines, codes, position papers, statements	81
	Presentations	27
	Research group/ innovation initiative reports	1
	Educational materials	1

	Submissions to public consultations (includes industry interest groups)	4
	Media releases	10
	Social media pages	5
	Total	**229**
Government	Websites of ministries and agencies responsible for dietary guidelines, policy related to food and sustainability/ consumption	5
	Working groups on related issues	2
	Total	**7**
Non-profit	Websites	3
	Reports and briefs	21
	Campaign materials	1
	Other	1
	Total	**26**
University/Academic	Websites of researchers working on issues related to sustainable diets	5
	Research projects, fellowships or grants funded by food industry	4
	Academic Association	1
	Academic literature	~250
	Total	**~260**
Other Sources	International organization websites/ documents	10
	News articles / Industry reporting	81
	Webpages of business journals and business news platforms	1
	Industry-funded groups	5
	Multi-stakeholder group webpage	7
	Multi-stakeholder group reports and presentations	42
	Consulting/ accounting firm reports, blogs and websites	10
	Market research	45
	Books by Non-academics	7
	Other Company CSR Reports, Presentations, or Webpages	9
	Total	**217**

Supplementary Interviews

Semi-structured interviews were conducted with eleven key informants to provide supplementary triangulation data and a means of verifying outcomes from the central data analysis of documents. These interviews were arranged using a combination of chain-referral sampling and convenience sampling. Ethics approval was granted by the University of Waterloo Office of Research Ethics (#21145). Interviews were conducted with:

- 4 employees of Big Food company sustainability departments

- 2 sustainability consultants working with Big Food companies
- the Executive Director of a non-profit working with food and beverage companies on sustainability issues
- 2 employees of the sustainability departments of retailers
- the sustainability director of a start-up recently purchased by a Big Food corporation
- the sustainability head of food at a major corporation that has its own brand of food products but is not primarily a food-focused business (IKEA).

The initial intent was to have more interviews than the final number achieved. However, finding willing participants was a challenge. One interviewee noted that many sustainability professionals are so busy that they are not in a position to give up time to someone who is not going to benefit their business. I also found that interviewees were hesitant to provide names of others who may be willing to speak to me, or to pass along my information to other people in their network. This limitation will be discussed further in study limitations. However, it is important to note that this study seeks to understand how companies present themselves publicly, and thus documents and their statements made in industry news articles best capture the ways these companies wish to be perceived.

Gervais (2013) outlines an approach to studying actors and phenomena that may not always be accessible using different interview styles to gain information on past events, and put them in context of contemporary events. She goes on to explain approaches to the interviews ranging from classical semi-structured interviews, to interviews in the conversational mode, and interviews on archives (Gervais 2013). The approach to interviews for this study was informed by Gervais' (2013) method which starts with exploratory open-ended questions and deepens as the interview proceeds, which is consistent with guidelines for conducting semi-structured interviews (Leech 2002).

Interviews provided the thoughts and feelings behind events, such as the inclusion of sustainable diets in a CSR report, as well as insight on the relationships involved in each site of intervention between actors and ideas (Arksey and Knight 1999). It is useful to combine knowledge of historical events from institutional documentation and archives with interviews to get insight into the processes that went on to arrive at those documents. Questions were informed by the document analysis and early findings from coding. A general overview of questions is attached

in Appendix B, although these varied based on the direction of the conversation and the interview subject.

Questions were generally open-ended. In some interviews with participants that worked at Big Food companies, questions were related to specifics of the company's approach to a certain issue, or initiative. For example, IKEA has been one of the few major corporations to use the term sustainable diet in their sustainability strategy. For this interview, I inquired about the process of getting there, and how the term came to be included in the company's goals.

1.4.2 Data Analysis

The analysis for this study occurred in two major steps. First, to understand the key empirical findings, a thematic analysis (first cycle coding) of documentation was used to pull out the main sustainability strategies and priorities of Big Food companies. Second, these identified empirical themes were then analyzed *theoretically* (second cycle coding), using the analytical framework as a heuristic to study legitimacy. Thematic analysis was chosen as the primary analytic method due to its flexibility, as well as its suitability for using both deductive and inductive processes to examine data (Fereday and Muir-Cochrane 2006; Braun and Clarke 2006). Thematic analysis involves a thorough "reading and re-reading of the data" (Rice and Ezzy 1999, 258). Emerging themes are used as groupings for further analysis and code development (Boyatzis 1998). Document collection occurred throughout the period of this study from 2014-2018 in an iterative and continuing process. Documents were coded for themes using Computer Assisted Qualitative Data AnalysiS (CAQDAS) software, QSR NVivo. CAQDAS is used for a variety of reasons, and NVivo was chosen for its ability to deliver diverse tools. These attributes included: integration of different elements that make up the research project, organization of the data and objectives, exploration of the data, reflection and analytical insights through the use of memos, and interrogation of the data and analysis as the project unfolded through different search tools and auto-coding (Silver 2018; Silver and Lewins 2014). The coding was first conducted to determine what the primary sustainability strategies consisted of, and to ascertain how companies are engaging with ideas of sustainable diets and eating. Coding was then used again to examine areas where the sustainability strategies may overlap with the analytical framework described in

Chapter 3. The coding process is described in more detail below. Codebooks can be found in Appendix C to demonstrate the process of coding that occurred.

First Cycle Coding

The first cycle of coding (thematic analysis) was used to both familiarize myself with the data and generate initial codes. This type of coding can be further specified through Saldaña's (2012) subcategories of first cycle coding in two steps. In round one of first cycle coding, I used exploratory methods to assign preliminary codes to the data (Saldana 2012). Tentative labels were created using holistic coding which aims to "grasp basic themes or issues in the data" (Dey, 1993). Dey (1993) assumes that this is done by lumping larger units of data together rather than reading line-by-line, however, a "middle-order" approach between holistic as defined by Dey (1993) and line-by-line was used. Documents were read and themes were coded as they emerged, but also based on knowledge of the sustainable diets literature, and common approaches to sustainability. For example, in the first round of coding more specific codes were used, such as different commodities (palm oil, eggs, dairy), issue areas (deforestation, biodiversity, animal welfare, GHGs, human rights), common sustainability approaches (efficiency, LCA, materiality), or governance initiatives (Fairtrade, Global Reporting Initiative, UTZ), and frequently used ideas or concepts (transparency, growth, yields).

Once "round one" of first cycle coding was complete, I used the codes created to decipher broader themes that characterized the sustainability activities of Big Food companies. I then re-coded (round two), looking more specifically for data that related to these themes to understand them more thoroughly. These included a set of codes on measuring sustainability, a set of codes around sustainable sourcing, a set of codes on efficiency and production improvements, and a set of codes on portfolio changes. In the end, I decided not to pursue the codes on efficiency and production improvements as a stand-alone chapter, due to time and resource constraints. Additionally, these activities tend to fall under initiatives that companies have been pursuing for a very long time as a result of savings, and these initiatives being generally considered "low-hanging fruit" studied extensively elsewhere (Maxime, Marcotte, and Arcand 2006; Baldwin 2015; Mahalik and Nambiar 2010; Meyers et al. 2016; Fluch, Brunner, and Grubbauer 2017; Ladha-Sabur et al. 2019). The other three areas became the main three categories of

sustainability strategies that I pursued. The other types of sustainability strategies that Big Food corporations have pursued (including waste reduction, emissions reductions, renewable energy, water management, and sustainable packaging and recycling) fall under the efficiency and production improvements theme. These efficiency and production sustainability strategies are also less explicitly linked to sustainable diets, although still part of what would be considered under the broader term. The codes that were used in the round one of the first cycle were often grouped under codes in the 'second round' first cycle coding. For example, common approaches such as LCA, and materiality would both go under measuring sustainability.

Second Cycle Coding

The second cycle coding (theoretical analysis) involved looking through the data and analyzing how the sustainability themes identified may relate to the analytical framework as laid out in Chapter 3. Here, theory is defined as "a general explanation or stylized facts about events, phenomena, or their attributes, based on a set of factors and their causal relations" (Meyfroidit et al. 2018). These explanations are combined into an analytical or conceptual framework, defined as, "a collection of concepts considered as relevant for analysis of a phenomenon, which constitute lenses for looking at reality and boundary objects for inter- and transdisciplinary communication" (Meyfroidt et al. 2018). The analytical framework for understanding the agrifood landscape was used as a heuristic to enable thinking about the interaction between the sustainability strategies and features of the political and economic features of the agrifood system that impact the environmental politics of food, and are established in the vast literature and theory in this area. Due to the immense complexity involved in an interdisciplinary study such as this, heuristics can be a useful way to think through complexity and capture elements in a holistic way (Huutoniemi and Willamo 2014). Huutoniemi (2014, 9-10) notes that "there are not ready made rules for making sense of a mess" and thus heuristics can facilitate thinking in a way that does not guarantee a solution and accepts that a positivist and rational method is not possible in cases of wicked problems, because this depends on predictability.

The second cycle coding followed elaborative coding method. Elaborative coding "is the process of analyzing data in order to develop theory further" (Auerbach and Silverstein 2003, 104). It is contrasted to first cycle coding which took a bottom-up approach with no pre-conceived notions

about what the data would reveal. The second cycle coding involved examining the coding done in the first cycle, against the conceptual framework used as a heuristic to analyze the data, focusing in on the connection of the features – complexity and distance, weak and fragmented governance, ideational debates, and power – and their interactions with legitimacy. These features of the global food landscape play a role in the way that sustainability activities are constructed and communicated. The analytical framework was used to think through the ways that previously studied aspects of governance in food and the environment may influence the ways that Big Food's sustainability strategies are articulated or become norms.

To illustrate this process, I will use an example. Sustainable sourcing emerged early on as a category through the first cycle coding on commodities, supply chains, and governance initiatives. Once sustainable sourcing was established as a category for coding, the documents were coded for all the sections that pertained to this topic. In my second cycle of coding, the documents were coded for areas that relate the sustainability categories to the characteristics identified in the conceptual framework. For example, many of the discussions of sustainable sourcing involve partnerships with other industry players where companies and multi-sector initiatives are working together, advocating for similar policies and positions in public discourse. This consistent messaging across major brands in the industry lends to the discursive power of these initiatives and serves companies to frame themselves as a legitimate part of the sustainability solution.

1.4.3 Validation of Findings

Validation of findings was conducted in two ways. First, the semi-structured interviews were conducted after extensive analysis of the documentation. The interviews were used as a way to evaluate the data and analysis to that point and validate the conclusions with primary informants that represented a cross-section of individuals working in the food and beverage manufacturing industry (Leininger 1993). The interviews were coded in a different manner than the documents analyzed as it was decided they would act only as supplementary information and not the primary source of data. As they were completed near the end of the study, they were not coded for themes but instead were used to evaluate the previous coding against what the informants had stated. Questions were asked in an open-ended way that allowed respondents the opportunity to

disagree with the findings. This way, areas where the assumptions and analysis were found to not align could be adjusted or revisited. They were also coded as in the second cycle coding using the theoretical framework as a heuristic to perform elaborative coding. Second, validation was conducted through automatic coding (auto-coding), using NVivo to show that the key sustainability issues identified were of importance to companies. Auto-coding is a new feature in NVivo Plus, which can be used as a verification tool once you have already coded. It can validate your thinking or reveal missed elements in the data. It is computer-driven, and thus not influenced by researcher bias (QSR International n.d.).

1.5 Study Limitations

This study did face some limitations. The literature on the environmental impacts of food processing and processed food consumption is either very industry focused, or in terms of consumption, in its infancy. The relatively small amount of publicly available data that looks at the life cycle impacts of ultra-processed foods has been, in my opinion, a reason for their relative lack of academic study to this date. Despite the dearth of study in this area, the evidence continues to grow and often shows higher environmental impacts for ultra-processed foods (see Chapter 2, p. 46-47).

While this study was focused on documents and media as the most relevant forms of data, the study also did face challenges in gaining access to experts in the field to explore opinions beyond the information that was available in reports and media. In one of my interviews, a sustainability consultant commented on academics being disconnected from the realities that businesses face on a day-to-day basis. I am appreciative of this sentiment. However, I found it incredibly challenging to gain access to businesses. I also understand the fact that businesses need to prioritize activities that are beneficial to their bottom line. Nevertheless, it makes it difficult to reconcile the perceived division between academic understandings of the issues in the businesses they seek to study and business interpretations. I had many emails that went without response, and when some of the interviewees did offer to try to connect me with other willing participants, many chose not to participate. In other situations, I faced gatekeepers where I had to go back and forth with an employee of the company to convince them to find someone to speak with me, and then wait as they found a willing participant within these incredibly large organizations.

Corporate sustainability managers were hard to get in touch and schedule interviews with. With more time and money, I would have spent time pursuing these contacts through industry conferences to use the ability to meet face-to-face with people and get their information. These types of face-to-face interactions may have provided additional insights beyond those available in publicly available information. However, these perceptions may only have represented the views of individuals working within those companies rather than the companies' agreed upon positions – an important distinction for this study.

Finally, time is always a factor in academic studies. This work was limited to a scope that could realistically be examined in the period of time given to complete doctoral work. The limited time frame also proved challenging as sustainability efforts in this field change rapidly with companies constantly announcing new initiatives and actions, NGOs releasing new information about company efforts, and new multi-stakeholder forums launching frequently. I purposefully left my interviews until later in the study, knowing that I would not get a lot of time to interview sustainability professionals with extremely busy schedules. I wanted to have a good comprehension of the strategies before asking questions to know the types of activities they were engaged in, and what I wanted to know more about. Leaving the interviews until closer to the end of the study was what I believe to be the right choice, but I would have liked to have time to conduct more interviews, had this not been such a challenging endeavor.

1.6 Organization of the Thesis

The thesis unfolds in 6 subsequent chapters. Chapter 2 provides a review of literature on sustainable diets that seeks to understand the emergence of the term, key policy debates, and efforts to define the term. It also situates Big Food and ultra-processed foods into the sustainable diets debate while at the same time problematizing the concept of sustainable diets. Chapter 3 outlines the conceptual/analytical framework used to understand the sustainability activities of Big Food through key political and economic features of the global agrifood landscape. It is based on a framework published in a Special Issue of *Global Environmental Politics* on Food and Agriculture (Clapp and Scott 2018). The framework outlines four phenomena that are shaping the global environmental politics of food and are relevant for the political economy of food systems questions. These phenomena are complexity and distancing in the food system,

weak and fragmented governance, polarized ideational debates, and uneven power dynamics. I have also added further insights on legitimacy, important to using the framework to examine Big Food corporations efforts to promote themselves as a legitimate part of the solution to future food system sustainability and food security.

Subsequent chapters identify, examine, and discuss the policy relevance of key trends in sustainability strategies of Big Food corporations, particularly related to sustainable diets. Chapter 4 focuses attention on the 'scientization' of sustainability in Big Food corporations, and the ways that this trend may provide perceived legitimacy in ideational debates and works to solidify power dynamics in this system. Chapter 5 explores sustainable sourcing as a prominent sustainability goal of Big Food corporations, using the theoretical framework to understand how this phenomenon has proliferated, how it is useful to Big Food, especially with respect to meeting sustainability goals. Chapter 6 engages with efforts to update product-portfolios to provide more sustainable and healthy offerings to consumers. This chapter illustrates how these changes narrow the parameters of sustainability while taking advantage of ideational debates, uneven power dynamics and weak and fragmented governance to attempt to frame corporate sustainability strategies as legitimate. At the same time, these efforts are part of attempts by some actors to legitimize consumers as a site of governance and change. Finally, Chapter 7 discusses the findings of this study, explores identified gaps, and unpacks policy implications for sustainable diets.

Chapter 2 Sustainable Diets and Ultra-processed Foods

Introduction

The concept of 'sustainable diets' serves as a starting point for discussions around sustainable eating and eco-nutrition that have become pervasive in academia, civil society, and the media in recent years. The concept has gained attention since it re-emerged in the 2000s with considerable

growth in the number of academic articles published on the topic, and coverage in the media (Mason and Lang 2017). However, within the sustainable diets literature, there has been little attention paid to Big Food corporations, despite other literature in the nutrition field showing the influence they have on shaping eating patterns globally.

This chapter first offers a short history on the emergence of the concept and its re-emergence as a policy idea in the 2000s and 2010s. It then examines how the literature has worked to define what a sustainable diet is, and what questions remain. The chapter illuminates the variety of actors that have contributed to the literature and discussion on sustainable diets, clarifying their different interpretations and reactions. However, sustainable diets are not without their challenges, and the next section problematizes the concept, unpacking some of the major issues with the way it has been conceived and potential for various interpretations. Finally, this chapter discusses the importance and challenges of sustainable diets, in the context of ultra-processed foods and the Big Food corporations that produce them.

This chapter demonstrates the important ways that sustainable diets differ from previous conceptions of food system sustainability, which is important for the analysis that follows. At the same time, this work explains that sustainable diets are still in the process of fully being defined, and in that development the original *intention* of the term may be lost as new actors *interpret* it in ways that affirm their current actions. Importantly, this chapter establishes a main point for the argument that follows - that Big Food shapes eating patterns, and that the current trends related to Big Food's involvement have been correlated with poor health outcomes. How Big Food firms frame sustainability within the context of growing awareness of sustainable diets has repercussions for future food system sustainability from both a policy perspective and for outcomes more broadly. At the same time, the focus on diets legitimizes individualization and the types of policy and governance that align well with it, for example, private governance and labels.

2.1 Emergence of Sustainable diets

Frances Moore Lappé's 1971 book, *Diet for a Small Planet* brought the ideas behind sustainable diets into mainstream discussion during the 1970s and 1980s. The book highlighted the burden

of meat production on the planet, making the case that animals act as reverse protein factories by taking in more energy than they make available when eaten (Moore Lappé 1971). The book was influential in mainstreaming awareness about the impact of diets. A number of other phenomena contributed to the "intellectual roots" of sustainable diets, including the famines taking place during the 1970s, Western counter-culture on simpler lives and anti-consumerism, and even further back, Malthusian concepts of food supply (Mason and Lang 2017, 15). These literatures matured, and by 1986, Gussow and Clancy coined the phrase 'sustainable diet'. In this early work, the concept of a sustainable diet was used as a call for including environmental factors into dietary guidance (Gussow and Clancy 1986). Gussow went on to continue this work throughout the 1990s, and in 2015 Clancy spoke at the Dietary Guidelines Advisory Committee's (DGAC) second public meeting (Freidberg 2016). The work of Gussow and Clancy was heavily criticized by others in the field of nutrition science for not being objective and promoting a social cause. Gussow published a 1999 article reflecting on the issue twelve years after that first article. In it, she made public some of the critiques, with one critic writing the following to the journal where Gussow and Clancy's 1986 work originally appeared,

> If. . . your goal [is] to provide a soapbox to activists and protagonists, you have succeeded. . . Perhaps the authors are excellent nutritionists, but this article indicates that they are willing to subvert their professionality in order to promote their social cause. Such phrases as 'Consumers today need to make food choices . . . which contribute to the protection of our natural resources'. . . negate the objectivity that should be the hallmark of University publications. Others have attempted to decide what to allow the population to do, with tragic results (Gussow 1999, 194).

With these criticisms, much of the work at this time was dismissed and the idea was not discussed seriously as a policy concept. However, this changed in the 2000s because of growing awareness of the climate and environmental challenges in the food system, coupled with the rise of life cycle assessment demonstrating that certain foods have quantifiably greater environmental impacts. At this time, sustainable diets earned a definition at a 2010 FAO symposium (shown in Chapter 1, p. 12).

The definition emphasizes a variety of issues that are important to consider, with much of it building on food security definitions, while adding sustainability concepts and extending that to future generations. The definition leaves much to be further defined, as it is broad, uses undefined terms, is repetitive and hard to operationalize, leading many to explore further what

this definition might entail (Garnett 2014; Johnston, Fanzo, and Cogill 2014; Macdiarmid et al. 2012). Additional study has debated what exactly a sustainable diet might look like, what factors should be prioritized, and what policies might encourage more sustainable diets. In order to work toward answers, debates have often focused on methods (scientific, or data collection) used to quantify sustainable diets with a variety of studies focusing on different metrics, such as water use, land use, and emissions (Mason and Lang 2017; Jones et al. 2016). The debate over metrics has led to more confusion over what aspects should be prioritized in working towards sustainable diets – be it health, social issues, or environmental issues, and further, what areas within those umbrella areas. Thus, much work continues on how to define a sustainable diet.

2.2 Defining sustainable diets

The academic literature that has arisen around the concept of sustainable diets since the 2010 definition from the FAO attempts to clarify, quantify and prioritize, but is rarely (until recently) critical of the concept. Thus far, the literature most closely related with the sustainable diets debate has focused on modelling and quantifying the environmental impacts of different dietary patterns using Life Cycle Assessment (LCA) studies on foods within that diet (Macdiarmid et al. 2011, 2012; Perignon et al. 2016; Tilman and Clark 2014; Tom, Fischbeck, and Hendrickson 2016a). Outcomes are used to then determine what a sustainable diet could be (Garnett 2014; Macdiarmid et al. 2011). These studies have been widely cited to show that, in general, animal products have a far higher environmental impact through higher emissions, water use, and land use (Aston, Smith, and Powles 2012; Carvalho et al. 2013; Soret et al. 2014). Concurrently, several studies have found that processed foods associated with poor diets also have a higher environmental burden despite limited research in this area (Hadjikakou 2017; Nilsson, Sund, and Florén 2011). Quite often, these studies leave out, or do not discuss other environmental impacts that result from the production of animal and ultra-processed foods, for example, waste lagoons from large scale animal agriculture operations, or even smell-scapes that result from concentrated animal production, or the packaging burden from processed and packaged foods (Weis 2013a). They also lose much of the broader picture in their narrow focus on the quantitative assessment of only a few environmental indicators (most often carbon reductionism), an issue that is emblematic of much of the work in this field.

Some studies have attempted to measure broader aspects of sustainability, looking at cultural value, affordability and nutrient density of certain foods in conjunction with their environmental impacts (eg. Drewnowski 2018). Consumer acceptability has been a focus of several studies, with researchers attempting to understand what consumers will eat, and how to make environmental improvements to diets with only limited changes to current eating patterns (Kramer et al. 2017). However, these studies are often context dependent, might not consider level of processing, and may vary in the way they measure balance between nutrient density and environmental impact (Kramer et al. 2017).

Other studies have examined the perceived health outcomes of different dietary scenarios that reduce environmental impacts (Aston, Smith, and Powles 2012; Scarborough et al. 2012; Springmann, Mason-D'Croz et al. 2016). Many of these scenarios associate reduced consumption of animal products with improved health outcomes, and in one particular case, major economic benefits for countries facing mounting healthcare costs argued to be the result of an increased diet-related disease burden (see Springmann et al. 2016a). While not a specific focus of the literature on sustainable diets, elsewhere there has been extensive literature connecting ultra-processed foods with poor health outcomes (Brownell 2004; Drewnowski 2004; Fiolet et al. 2018; Monteiro et al. 2017).

Finally, moving beyond the measurement of dietary impacts, discussion of the policy and cultural changes required to reduce consumption of certain products is beginning to flourish. A number of non-governmental organizations (NGOs), including Chatham House, World Resources Institute and the Barilla Center for Food and Nutrition, have published papers in this vein, with discussion of a variety of methods that may move the public perception (Bailey and Harper 2015; Ranganathan et al. 2016; Wellesly, Happer, and Froggatt 2015; Barilla Center for Food and Nutrition 2015, 2018). One study found that many people were willing to make some dietary changes, and could even be persuaded that a 'meat' tax is necessary (Wellesly, Happer, and Froggatt 2015). Many of these organizations operate under the assumption that it will not take significant sacrifice and that citizens can continue to eat meat, dairy, eggs, and processed foods with only small reductions or changes (Barilla Center for Food and Nutrition 2015; Wellesly, Happer, and Froggatt 2015). For example, the Barilla Center for Food and Nutrition's

2015 Double Pyramid report claims, “Food is one of the areas of life where personal well-being can be reconciled with that of the Planet. Without giving anything up.” (Barilla Center for Food and Nutrition 2015) Simultaneously, some organizations and researchers are pushing governments to adopt more sustainable dietary guidelines as a first step towards realizing sustainable diets (Gonzalez Fischer and Garnett 2016; Lang 2017).

2.2.1 Reactions to Sustainable Diets

A variety of actors have a stake in the outcomes of debates that occur on sustainable diets, and there has been a number of different reactions to both the threat and opportunity that the concept presents. As outlined above, academic researchers have continued to publish under the banner of sustainable diets, clarifying, quantifying, and prioritizing. A number of these scholars have also engaged with civil society organizations to disseminate knowledge, advocate for the uptake of sustainable dietary guidelines, and to keep sustainable diets relevant in policy discussion (see for example, the advisory board of the EAT Foundation 2018; Lang 2017). Despite numerous studies on sustainable diets, there continues to be a dearth of work that studies the power and politics that occur within the debates around this topic.

Working with NGOs, many academics have been able to leverage their work into numerous campaigns and partnerships. NGOs have largely built on the work of academics to advocate for greater uptake of more sustainable eating practices, and have pushed for dietary guidelines that include sustainability. Organizations such as the Barilla Center for Food and Nutrition (BCFN) and the World Wildlife Fund (WWF) UK have used media channels to reach citizens on this issue. WWF UK launched a campaign called the “Livewell Plate” which builds on the country’s official dietary guidance, the Eatwell Plate (Macdiarmid et al. 2011). The BCFN is well known for its double pyramid, which depicts the commonly used pyramid for identifying the nutrition of foods and contrasts it with an inverted pyramid that shows the environmental impacts of foods (Barilla Center for Food and Nutrition 2015). The Double Pyramid brings attention to the fact that many of the same foods that dietary guidelines find to be less healthy are also higher in environmental impact. The World Resources Institute (WRI) also made headlines when it developed a shift wheel, identifying a variety of ways to shift diets under four categories –

evolve social norms, maximize awareness, sell a compelling benefit and minimize disruption (Ranganathan et al. 2016; Ranganathan and Waite 2016; Harvey 2016).

NGOs have also partnered with business in a variety of endeavours, often to provide greater availability of alternative protein sources, with lower environmental impacts that are still acceptable to consumers. Examples of this include the WRI's Better Buying Lab, which "brings together the brightest and best minds from consumer research, behavioral economics and marketing strategy – along with companies in the food industry – to research, test and scale new strategies and plans that help consumers select sustainable foods" (World Resources Institute n.d.). The Carbon Trust also partnered with Quorn, a meat-alternatives maker to launch a report and media campaign on the "Case for Protein Diversity" (Cumberlege, Kazer, and Plotnek 2015). Forum for the Future, also a UK-based non-profit, partnered with Volac, a dairy company to launch a Protein 2040 campaign which also included Hershey, Quorn, World Wildlife Fund, Waitrose, Target and others (Forum for the Future 2016). The approach of these partnerships, and NGO campaigns more broadly, encourages slow nudges aligning with a corporate view of sustainable diets, rather than more transformational change. However, some argue that there is a bigger role for governments to play in policymaking around sustainable diets (Mason and Lang 2017; Wellesly, Happer, and Froggatt 2015).

Governments have been slow to respond to discourses of sustainable diets. A handful of countries have updated their dietary guidelines to add sustainability to varying degrees (Gonzalez Fischer and Garnett 2016). Dietary guidelines have been the first line of policy response, with academics and civil society arguing for this approach (Gussow and Clancy 1986; Lang 2017; Macdiarmid et al. 2011). However, dietary guidelines are both contested as a source of creating dietary changes, and still predominantly used in higher-income countries (Gonzalez Fischer and Garnett 2016; Knight-Agarwal and Mellor 2017). Efforts to change guidelines in recent years have also been plagued by controversy for the evidence used, and whether or not environmental considerations are included (Knight-Agarwal and Mellor 2017). The addition of environmental concerns has created political battles in a number of cases, most notably in the United States, where a variety of discourses about the sustainability of meat and livestock production played out (Freidberg 2016). A few governments have discussed economic measures and policy to

encourage lower consumption of high-carbon foods. In Denmark, the Danish Ethics Council, a government-appointed body, has recommended taxing beef to start, and implementing an eventual tax on all foods based on carbon intensity (Withnall 2016). Taxes have been advocated by some scholars to be an effective measure to change consumption of the targeted foods, but there is still relatively little evidence that links such an approach to actual improvements in overall diet and health (Thow et al. 2018).

The discussion of sustainable diets from the academic and NGO community, along with little action by governments on this front, has created policy space that is being filled by business. A vast literature on the environmental actions of corporate actors has found that businesses engage in corporate responsibility and environmental strategy for a number of, primarily, strategic reasons (Tienhaara, Orsini, and Falkner 2012). Corporate actors are being at the same time "pushed" by NGOs, and pulled by "green markets", but have also engaged in voluntary measures to avoid further regulation, with self-regulation proving to be largely ineffective in the long term (Tienhaara, Orsini, and Falkner 2012; King and Lenox 2000; Maxwell, Lyon, and Hackett 2000; Prakash 2001).

Businesses can both gain or lose from increased focus on sustainable diets – highly dependent on their main business or make up of their product-portfolio (discussed more in Chapter 6). For example, a company that has already shifted to providing healthier options or plant-based meals, may actually benefit from consumer interest in these products. The market for protein alternatives has been expanding rapidly. *Food in Canada: Canada's Food & Beverage Processing Magazine* recently wrote that "the meat-alternative sector offers manufacturers opportunities" because of their growing popularity (Food in Canada 2018). Citing the Mintel Global New Products Database findings, the publication shows that between 2013 and 2017, global meat substitute launches nearly doubled, and the segment has grown 90% in the last five years (Food in Canada, 2018). The Farm Animal Investment Risk and Return Initiative also argued in 2016 that protein alternative makers have projected growth potential of 8.4% in the next five years (FAIRR 2016). This trend is also highlighted by the launch of the Plant Based Foods Association in March 2016, and even more companies working on plant-based meat alternatives (Impossible Foods), egg replacers (Just For All, Clara), edible insects (Entomo

Farms, Bitty Foods, Big Cricket Farms) and laboratory meats (Mosa Meat, Memphis Meat) (Plant Based Foods Association 2018). These developments have not been ignored by big business, with Big Food companies buying up promising start-ups and investing through venture capital, as will be explored further in Chapter 6.

Unmistakably, there are companies that stand to lose if sustainable diets create a major shift in eating patterns. The meat industry has been vocal in its opposition to many of the arguments being made against it. The meat industry, led largely by the North American Meat Institute (NAMI) has campaigned against reducing meat consumption using a variety of tactics, including highlighting efficiency gains, comparing industrial systems to grass-fed production, maintaining meat's necessity as a part of a diet, downplaying the overall role of meat in GHG emissions, and to funding research that questions the science behind sustainable diets recommendations (Auestad and Fulgoni 2015; Capper 2012; Capper and Bauman 2013; Ridoutt, Hendrie, and Noakes 2017).

The Big Food firms studied here are not yet widely embracing the term *sustainable diet* in corporate sustainability strategy materials. None of the companies examined used the term in any of their full corporate social responsibility (CSR) reports, policies, or websites. Unilever stands out as an exception in that it is using the term 'sustainable consumption', even listing it in its materiality matrix[8]. The company is more than a food company and thus, its choice to use consumption over diet is logical. However, when Unilever begins to talk about sustainable nutrition in its *Sustainable Nutrition Manifesto*, it still often comes down to production issues, rather than changing what consumers eat in a meaningful way (Unilever 2017). More recently, the company launched a few products that link to its *Sustainable Nutrition Manifesto*, for example, Growing Roots, a plant-based snack brand. Danone has also shown a willingness to engage with dietary debates. The company did reference the Barilla Center for Food and Nutrition's Double Pyramid in its climate policy, and accepted that diets play a role in meeting climate targets (Danone International 2016).

[8] A visual representation of the company's most pressing CSR issues (discussed more in Chapter 4).

Recently, industry launched a partnership project, FReSH (Food Reform for Sustainability and Health), an initiative of the World Business Council for Sustainable Development (WBCSD), and the EAT Foundation. FReSH describes itself as, "an ambitious global business partnership that brings a consumer lens and systemic approach across the food system… [turning] the conventional 'farm to fork' on its head, working 'fork to farm'" (WBCSD, 2018). Members of this project from the food and beverage manufacturing sector include Danone, Kellogg Company, Nestlé, PepsiCo and Unilever. Other members are Google, BASF, Syngenta, Bayer, Cargill and more. Until June 2018, there was little information on what FReSH would actually do. On June 8, 2018, the initiative released two "Science to Solutions Dialogue" summaries based on dialogues hosted to bring together actors from across industry, civil society, and academia. The first SSD, "Putting Food in Food", saw participants from across business, academia and the non-profit sector assemble to discuss solutions to three problems – how to make processed food healthier and more environmentally-friendly, how to make processed food with less food waste, and how to "bring consumers along" (WBCSD, FReSH, and EAT Foundation 2018). The outcome document, unsurprisingly, suggests "science-based targets", and the latest "scientific thinking". The document also shows that companies acknowledge the need for more "multifaceted approaches", stating that discussions at the dialogue fell into the tendency to address a single consideration. Thus, a multidimensional calibration tool is suggested. In terms of solution spaces, the key outcomes of making food more environmentally-friendly and healthy came down to sustainable sourcing, and reformulation. These are demonstrated to be strategies already in effect. However, the document does call for a timeframe of two years and asserts that the change must be "transformational" (WBCSD 2018). The solution to "bringing consumers along" encourages businesses to develop "behaviour change programs that account for the main drivers of individual choice and capitalize on 'teachable moments'" (WBCSD 2018, 3). Many companies are already capitalizing on "teachable moments" to sell more of their products with recipes for "healthy" meals, and personalized nutrition. It is also worth pointing out that the notion that companies need to teach people how to eat plays exactly into the types of warnings coming out of critical nutrition studies and is reminiscent of Dixon's (2003) argument that corporate messaging stands in for other dietary advice, shown below.

Additionally, in the summer of 2018, Nestlé, Unilever, Mars, and Danone launched The Sustainable Food Policy Alliance, trying to develop a different relationship to the economy and society more broadly by focusing on changing policy (Dewey 2018). These companies had all left the Grocery Manufacturers Association (GMA) citing differences in opinion over labelling, while their peer, the Campbell Soup Company, made a bolder pronouncement citing "philosophical differences…on important issues" (Charles 2018; Raycheva 2018). Their new organization is, "focused on driving progress in public policies that shape what people eat and how it impacts their health, communities and the planet" (The Sustainable Food Policy Alliance 2018b). The founding members list updates to their portfolios as one site of progress – including reformulation, and collective and voluntary action on sodium reduction, transparency, responsible marketing, and reducing their environmental impact (The Sustainable Food Policy Alliance 2018b). There are five priority areas for Alliance - consumer transparency, environment, food safety, nutrition, people and communities (The Sustainable Food Policy Alliance, 2018a). Interestingly, the environmental focus calls for innovative and 'science-based' solutions, while the nutrition section calls for policies that help people make 'better-informed food choices', linking this not only to health but to sustainability. The Alliance celebrates its commitment to these issues, and its current work, stating the following,

> The Sustainable Food Policy Alliance was founded on the principle that food companies can and should be doing more to lead and drive positive action for the people who buy and enjoy the foods and beverages we make, the people who supply them, and the planet on which we all rely…. As an Alliance, we commit first and foremost to leading by example. Each member company has independently proven a willingness to advocate for the long-term interests of the people who farm and supply our raw materials, and people who make and consume our products (The Sustainable Food Policy Alliance 2018a).

Nevertheless, as this thesis will show, regardless of whether or not companies are currently using the term sustainable diets, a renewed interest in eco-nutrition, and increasing awareness of the impacts that food production has in policy circles, mass media, and individual conversations, has brought about unique opportunities for Big Food to respond.

2.3 Ultra-processed foods and Big Food

The ubiquity of ultra-processed foods, and their place at intersection of environmental and health challenges, makes it important to consider the actions of their makers. The following section

unpacks what is meant by “ultra-processed”, explaining the NOVA food classification. In doing so, it will examine the literature on ultra-processed foods that has explored its consumption levels, health impacts, and environmental impacts.

The NOVA Classification system is a way of classifying foods and diets according to the amount, purpose, extent and type of processing – including physical, chemical, biological (Monteiro et al. 2016). It was first put forward by a group of researchers at the University of São Paulo led by Professor Carlos Monteiro in 2009 (Moubarac 2017). After its development, the classification was refined and tested in a number of case studies across North America, Europe and Latin America (Moubarac 2017). The classification system has enabled researchers to study food in a different way, compared to a traditional focus on nutrients. NOVA allows for easier comparison between food systems, supplies, and dietary patterns within and between countries over time (Moubarac, 2017). The World Health Organization, and the Food and Agricultural Organization of the United Nations have recognized the classification system as a valid tool for research on public health and policy.

There are four categories in the NOVA classification: unprocessed or minimally processed foods, processed ingredients, processed foods, and ultra-processed foods. These four categories are detailed in Table 2.1 below. It is recommended by researchers that diets are composed primarily of foods in group 1 and 2, and that ultra-processed foods are eaten infrequently. Whereas ultra-processed foods have been defined with some precision, a single accepted definition of “junk food” does not exist due to the constantly evolving and somewhat subjective nature of what is considered “healthy” or “unhealthy”. Nevertheless, the term remains an effective explanatory concept in that it captures many ultra-processed foods and highlights their lack of nutrients and propensity towards being overeaten. Similarly, ‘discretionary foods’ captures the unnecessary nature of ultra-processed foods in meeting dietary needs.

Table 2.1: NOVA Classification by Food Processing (Carlos A. Monteiro et al. 2016; Moubarac 2017)

Classification	Definition	Food Examples
Unprocessed or minimally processed foods (Group 1)	Unprocessed foods, which can be referred to as 'fresh' or 'whole', come from plants or animals without any industrial processing. Minimally processed foods are unprocessed foods altered in ways that do not add or introduce any new substance (such as fats, sugars, or salt) but often involve removal of parts of the food. Minimal processing techniques typically preserve the food and so extend its duration, aid its use, preparation, and cooking, and improve its palatability.	They include fresh, dry, or frozen vegetables, tubers, grains and legumes, fruits and nuts, and meats, fish, seafood, eggs, and milk.
Processed culinary ingredients (Group 2)	Processed culinary ingredients are extracted and refined by industry from food constituents (such as fats, oils and sugars) or obtained from nature (such as salt). These substances are not or normally not consumed by themselves. Their main purpose is to be used in the preparation and cooking of foods, so as to make palatable, diverse, nourishing and enjoyable dishes and meals.	Processed ingredients include sugars, fats, oils, and salt.
Processed foods (Group 3)	Processed foods are made by adding fats, oils, sugars, salt, and other culinary ingredients to minimally processed foods to make them more durable and usually more palatable, and by various methods of preservation. Depending on how they are prepared and used in dishes and meals, these foods can be part of healthy diets.	They include simple breads and cheeses; salted, pickled or cured meats, fish and seafood; and vegetables, legumes, fruits and animal foods preserved in oil, brine or syrup.
Ultra-processed foods (Group 4)	Ultra-processed foods are not modified foods but formulations of industrial ingredients and other substances derived from foods, plus additives. They mostly contain little if any intact food. For these reasons they are often referred to in the literature as 'ultra-processed food products' or simply 'ultra-processed products'. The purpose of ultra-processing is to create products that are convenient (durable, ready-to-eat, -drink or -heat), attractive (hyper-palatable), and profitable (cheap ingredients). Their effect all over the world is to displace all other food groups. They are usually branded assertively, packaged attractively, and marketed intensively.	Examples of typical ultra-processed products are: carbonated drinks; sweet or savoury packaged snacks; ice cream, chocolate, confectionery; mass-produced breads/buns; margarines and spreads; cookies, pastries, cakes, cake mixes; breakfast 'cereals', 'cereal' and 'energy' bars and drinks; milk drinks, 'fruit' yoghurts and drinks; cocoa drinks; meat extracts and 'instant' sauces; infant formulas, follow-on milks; 'health' and 'slimming' products such as powdered or 'fortified' meal and dish substitutes; and many ready to heat products including pre-prepared pies, pasta and pizza dishes; poultry/fish 'nuggets'/'sticks', sausages, burgers, hot dogs, and powdered/packaged 'instant' soups, noodles and desserts. Alcoholic beverages are also included in ultra-processed foods. Products made solely of group 1 or group 3 foods containing cosmetic or sensory intensifying additives, eg. plain yoghurt with added artificial sweeteners, and breads with added emulsifiers.

The classification of foods by processing provides a different lens to assess foods and diets than is typical in the nutrition field. Issues with the traditional focus on nutrients have been highlighted by Gyorgy Scrinis, who introduced the concept of *nutritionism*, which explains the reductionist focus on nutrients rather than diets and food more broadly (Scrinis 2008). Nutritionism does not question that insights from nutrition science have been valuable but illustrates how they have been interpreted in an even more reductive manner, which decontextualizes, simplifies and exaggerates the role of certain nutrients in health (Scrinis 2013, 5). Nutritionism has been used to demonize certain nutrients, sell reductive diets, and more recently to sell functional and super foods based on their nutrients (Scrinis, 2013). The concept of nutritionism is useful because it has made clear the ease with which nutrition advice and science can be used to manipulate the public (intentionally or not) and shape diets, whether for better or worse. It highlights the power in the seemingly apolitical nature of science, as a tool that can be used for profit. Classifying food by processing forces the focus to be broadened to overall diets, and the makeup of a mix of foods by level of processing. It also advocates for simple advice that is generally accepted by the majority of nutrition experts – to eat more whole foods (category 1).

Ultra-processed foods have become dominant in diets and continue to expand into emerging markets (Monteiro et al. 2013b). The reasons for this trend are numerous, including: heavy marketing of these foods, especially to children; food environments where these foods are readily available almost everywhere; the greater propensity for these foods to be advertised and on sale in stores; longer work hours and reduced time for cooking; and, urban lifestyles disconnected from food production (Dixon, Carey, et al. 2014; Dixon, Woodman, et al. 2014; Ravensbergen et al. 2015). These are only a few of the reasons that ultra-processed foods have come to dominate. In numerous studies by researchers using the NOVA Classification system, the same trend has been found, consumption of ultra-processed foods makes up 40 to 60% of diets in many high-income countries (Juul and Hemmingsson 2015; Monteiro et al. 2017; Moubarac 2017). At the same time, the consumption of these products is increasing in the rest of the world, with the greatest growth happening in developing countries (Monteiro et al. 2013b). This growth is not by error but by design, with companies openly targeting developing countries for growth, and the

market data supporting this upward trend (Baker and Friel 2016; Crawford 2016; Euromonitor International 2017c).

These inclinations are critically important due to the known health impacts from these foods. Ultra-processed products are associated with the nutrition transition, away from diets that contain more whole foods to diets – referred to by some as "the Industrial Diet" or the "Neoliberal Diet" – that have increased salt, sugar, fat, and animal products (Popkin, Adair, and Ng 2012; Otero 2018; Winson 2013). The nutrition transition is detrimental to the achievement of more sustainable and healthy diets and highlights the importance of these companies for examination in efforts to move towards more sustainable diets. Ultra-processed products are associated with rising obesity levels globally (Asfaw 2011; Juul and Hemmingsson 2015; Monteiro et al. 2017; Popkin, Adair, and Ng 2012). Obesity and these dietary patterns are also connected with other forms of non-communicable disease, including type 2 diabetes, heart disease, and stroke (Moubarac 2017; Popkin and Kenan 2016). Additionally, ultra-processed food consumption has been shown to impact diet quality with lower micronutrient intakes in populations that consume high levels of these foods (Louzada et al. 2015). At the same time, there is some evidence to suggest that fortification of these foods is responsible for some individuals meeting their daily needs of certain micronutrients, and simultaneously, in the overconsumption of some micronutrients in diets (Fulgoni et al. 2011; Lawrence 2013). Most recently, there has been some correlation shown between the consumption of ultra-processed foods and cancer (Fiolet et al. 2018). The authors of this study are quick to note that despite correlation, there is not yet any evidence for causation, but identify some potential mechanisms of causation, which may prove important in the coming years with more research (Fiolet et al. 2018).

While most dietitians and policy makers agree on the health impacts of ultra-processed foods and call for reduced consumption, there are few studies demonstrating sustainability outcomes of these foods. However, those that have been done indicate higher environmental impacts given the additional water use, energy use, GHG emissions, and from processing and packaging (Bradbear and Friel 2011; Pimentel et al. 2008; Sage 2011). Studies in Sweden, Switzerland, and the United States have all found that items like soft drinks, chocolate, crisps, candies, and alcoholic beverages have higher life cycle impacts based on metrics such as eutrophication-

potential, GHG emissions, energy and water use (Carlsson-Kanyama, Ekström, and Shanahan 2003; Jungbluth, Itten, and Schori 2012; Jungbluth and König 2014; Nilsson, Sund, and Florén 2011; Pimentel et al. 2008). Hendrie et al. (2014) found that "non-core" foods were responsible for 27% of total food-related GHG emissions. More recently, Michalis Hadjikakou (2017) conducted a study to estimate the environmental impacts of discretionary foods (primarily ultra-processed foods) in Australian diets. He found that up to one-third of the environmental impact of diets across water, life cycle energy use, ecological footprint (land use), and CO_2-e, was from these discretionary foods (Hadjikakou, 2017).

In the EU, the Consumer Footprint project works to create an ecological footprint based on representative products and services purchased and used in one year by an EU citizen. A subset indicator was developed using a basket of food products. In 2017, a report released included pre-prepared meals as one category. The report found that ready-made meals have additional impacts when compared to less-processed foods and recommended a reduction in the consumption of ready-made products as an additional improvement option for diets (Castellani, Fusi, and Sala 2017). Similarly, Schmidt Rivera et al. (2014) found that ready-made meals had higher GHG emissions than unprocessed alternatives. Home cooking also has impacts from energy and water use, to food waste. This focus on the impact in homes was a feature of the food miles debate. However, one study found that similar meals made at home, semi-prepared, or ready-to-eat actually had relatively little difference in overall impact across a variety of factors as the differing impacts "even each other out" (Raloff 2014; Sonesson et al. 2005). Other studies have indicated similarly that home cooking does not contribute to a significantly different overall impact, rather agricultural production, the food chosen, and waste behaviours are far more significant (Dutilh and Kramer 2000). When it comes to cooked meals, there remains debate, and a number of contextual factors play a role. However, with the rise of snacking, there is an increased consumption of processed snacks with likely higher impacts than unprocessed snacks. This trend aligns with findings that diets high in processed foods have higher environmental impacts.

The vast variety of foods that are considered under the banner of ultra-processed means that there will certainly be divergent impacts based on the type of food, processing required,

packaging, and associated consumption practices. It is important to note that some foods that fall under this category may not necessarily have higher impacts or may benefit from efficiencies of scale. There continues to be a research gap in this area, particularly related to environmental impacts beyond energy and emissions (Hadjikakou 2017). It is the combination of potentially increased impacts, their lack of necessity in diets and encouraged overconsumption that make ultra-processed foods an area where reductions should be pursued. However, it is important to note the many challenges that exist when it comes to changing dietary behaviour.

2.4 Useful concept? Importance and Challenges of Sustainable Diets

This section will problematize the use of a consumption lens as a means of dealing with a wide variety of issues in the global food system. It is meant to capture some of the benefits and challenges of the sustainable diets concept, and to illuminate the ways that these may be used by Big Food corporations to interpret the term in ways that are beneficial to their legitimacy. There are numerous valid reasons for tackling consumption due to environmental concerns, and some scholars have pointed out the lack of thinking on the environmental impacts of dietary patterns as one reason for the importance of sustainable diets. There is growing consumption globally of foods that do not serve health and at the same time are causing increased environmental harms. The section will also contend with the challenges of sustainable diets, from the likeliness that the term individualizes responsibility, to the conceptual challenges of wrapping all the issues of the food system into one approach, while addressing incredibly complex and difficult topics like culture, society, politics and power. Not all of these challenges are unique to sustainable diets, but the focus on consumption does lead to questions that are not inherent in more production-focused food system sustainability approaches.

Sustainable diets came about as a way to begin to consider the impact that food consumption choices have on the environment. Many authors who have worked tirelessly for years to bring attention to environmental issues in the food system endorsed the idea of sustainable diets as a way to consider consumption, which had not been previously done in the academic discourse that focused heavily on issues of production (Mason and Lang 2017). In early work on the issue of sustainable diets, the focus was predominantly on meat, as discussed above. One of the advantages of the consumption lens used in this way is that it not only brings light to the

environmental issues that result from certain types of consumption, but also draws attention to the global inequities in consumption. The 'meatification' of diets as a concept not only highlights the rapidly growing consumption of meat in certain areas of the world, but also how it is disproportionately distributed (Weis 2013b). There is extreme inequity in the way that food is circulated globally, and sustainable diets draw attention to certain products that have higher impacts but are also consumed more in high-income countries. Ultra-processed foods have a similar trend to meat in that the nutrition transition has meant their increased consumption, but there are also socio-economic differences in their consumption within high-income countries (Darmon and Drewnowski 2015). Another positive of sustainable diets is that it can bring sustainability concerns to the forefront that may not get much attention in production discussions. For example, while the environmental issues surrounding meat consumption have become better known, there is also attention paid to animal welfare, the waste created by consuming only certain parts of animals, or the ethics of eating animals more broadly. The bringing together of different issues under one umbrella is helpful and important, as calls for more holistic conceptions of sustainability continue (IPES-Food 2017b). Sustainable diets highlight the ways in which consumption drives production, at least in part. However, as will be discussed below, sustainable diets still demonstrate a number of challenges that may make the concept less helpful over time, particularly dependent on the interpretation of the concept.

2.4.1 Problematizing Sustainable Diets

Since the sustainable diets notion came into focus again in the 2000s and 2010s, there has been a variety of reactions to the term. Mason and Lang (2017) provide eight categories for these responses. They range from denying that there is a problem with dietary sustainability, to making it an issue of consumer responsibility, to providing clear advice on sustainable diets, or choice-editing. A pertinent criticism of a focus on consumption is the fact that it often ends up looking to consumers to make changes (Maniates 2001; Wahlen 2009). The 'individualization of responsibility' becomes a risk. However, as Maniates points out, there are a variety of ways that consumption patterns can change that do not entail the type of weak individualized environmentalism that is common (Maniates and Meyer 2010; Maniates 2001). Despite this contention, much of the literature that focuses on sustainable consumption tends to lead to three main strategies as described by Wahlen and Dubuisson-Quellier (2018, 8): education and

information campaigns; nudges and defaults; and tax, price, and labelling. However, as Shove (2010) argues, transitions of consumption need to be embedded in the interactions among "infrastructure, institutions and organization of everyday life" (Wahlen and Dubuisson-Quellier, 2018, 10). Wahlen and Dubuisson-Quellier (2018) emphasize that no single actor should be responsible for sustainable consumption and offer a focus on social practices as a way to think through the complexity of consumption decisions.

Individualizing consumption solutions can also place blame squarely on those least able to make change. This issue has arisen in the context of public health and nutrition debates over obesity. Scholars in this field have done work on the politics of problematizing bodies, with an entire literature on fat studies emerging in recent years (Cooper 2010). Julie Guthman (2011) argues that the focus on diet is a simplistic way of explaining obesity, and explores a variety of other factors including epigenetics and ecotoxicology. The conceptualization of obesity as a "crisis" furthers a politics of disgust around fat bodies. Guthman (2011) contends that the prevalence of obesity rises from the transformation of bodies into areas of accumulation, absorbing a crisis of capitalism. Kima Cargill (2015) ties the overconsumption of food, only one factor in obesity, to a broader problematic culture of consumption. These authors suggest is that the conceptualization of dietary choices and outcomes of a problematic food environment have consequences for who is blamed, who is seen as lazy, and who is ultimately responsible for fixing "the problem".

Similarly, Christopher Mayes (2014) shows how public health authorities, scholars, and corporations have all agreed that greater information through food labels is a good thing, and that in doing so it has "medicalized" food consumption by exaggerating the nutritional value and health effects of food. He argues that food labels act as "a surrogate for expert knowledge that guides consumption and produces individuals as self-governing subjects responsible for making health-related choices" (Mayes, 2014, 381). Mayes argues that this approach is reductive and notes how unsuccessful nutrition science has been in verifying causal relations between for example, a specific nutrient and chronic disease. Rather, Mayes argues, as many others have, that a variety of factors are associated with the incidence of disease in the population (Mayes, 2014). The social determinants of health are instead more significant in determining chronic disease than individual behaviours (Baum and Sanders 2011; Marmot and Wilkinson 2005; Williams

2013). Others have made similar arguments regarding the broader policies in place that uphold certain eating habits that are disconnected from day-to-day consumption choices. Raj Patel writes in a 2016 commentary about subsidies that he argues help the food industry while promoting poor health:

> "If we are to ensure that everyone in the United States is able to eat healthily, policies will need to raise household income and ensure that the food industry pays for the damage it has caused. An analysis of food subsidies points to the fact that poverty and environmental damage are public health issues. The medical community would be valuable allies in the political coalition required to move us away from our current, damaging addiction to 'cheap' food" (Patel 2016).

This line of inquiry, as well as those into social determinants of health bring light to the challenges in aligning the poor health outcomes seen in the population with a wide variety of potential contributors. These same challenges exist in making the link between certain eating behaviours and environmental outcomes, creating further questions around the usefulness of sustainable diets as a concept.

Sustainable diets are not as clear cut as they may seem when they are distilled down to simple advice, such as eat less meat, eat more plants, or choose water (Garnett 2014; Gonzalez Fischer and Garnett 2016). While it is important not to discount the significant connections between certain products and environmental impacts, it is equally important to consider the nuance and complexity of arguments put forward on science, health, sustainability, and consumption drivers. In a recent letter to the editor in the *Journal of Cleaner Production*, Ernstoff et al. (2017) note the difficulty in comparing and interpreting different studies that attempt to quantify the impacts of different dietary scenarios. In the work that attempts to quantify dietary impacts and outcomes, there has been a considerable variation in methods and metrics. This has led to some sensationalist arguments and public debates over the impact of certain foods. For example, a widely publicized article found that lettuce had higher carbon emissions than bacon (Nosowitz 2015; Withnall 2015). However, the research only shows that when comparing the emissions per calorie of lettuce versus bacon, lettuce has significantly higher emissions, while it is highly unlikely that anyone would eat an amount of lettuce that would make the two actually comparable (Nosowitz 2015). The example demonstrates the importance of metrics when comparing studies, but also the significant difference that substitutions in a dietary scenario can

make. The use of dietary scenarios and LCA data can be interpreted and used to portray narratives that are beneficial to some actors, making it less objective than it might at first appear.

Beyond the environmental complexity, nutrition science is still incredibly fraught with debates that have created confusion among consumers. The interdisciplinary field of critical nutrition studies has turned its attention to the history and political economy of nutrition science while also bringing consideration to the governmentality of bodies by drawing on feminist arguments (Dixon, 2016, 1112). Dixon (2009) explores how nutrition has impacted food value relations. She notes that nutrition science has been co-opted to extract surplus value and authority relations from food (Dixon, 2009, 322). This trend has shaped the way public policy and corporate strategy is framed to reinforce class-based advice on family functioning and routines. Nutrition science in this context has served to further individualize responsibility, while exacerbating the same social inequalities that have created the system as it is. Authority over food consumption and choice has shifted to market-based experts as a result of modern neoliberal systems (Dixon, 2003, 32). These trends have left corporate actors and the 'reflexive consumer' with more power (Dixon 2003). However, the authoritative consumer "occupies an ambiguous space" in which citizens are still searching for guidance on what to eat (Dixon 2003, 32). Similarly, Scrinis (2008, 46) notes that nutritionism has created nutrition-conscious individuals and a tendency towards a, "disempowered, confused, and dependent individual on the one hand, and an active, empowered and critically informed individual on the other". Biltekoff (2012) calls for a re-education that includes a critical dietary literacy. She notes that dietary ideas are considered objective reflections of nutrition truths but that in reality they reflect social ideas about what it means to be a good person or citizen (Biltekoff 2012). There is a growing importance around the social and cultural value of eating "right", which makes now the time for critical dietary literacy more important than ever (Biltekoff 2012). Nutrition science holds authority, while at the same time it disempowers consumers, asking them to be responsible for their consumption practices. This system creates space for experts on nutrition, as well as messaging by corporations and advertisers that stands in for experts, to shape consumer expectations and thus, consumption (Dixon 2009; Mayes 2014; Scrinis 2008).

Food, morality and identity interact in a number of ways that can shape social and cultural

conceptions of food and thus affect the behaviour of citizens and consumers (Coveney 2006; Veit, 2013). Concurrently, political and economic drivers interact with power in numerous ways. As an example, changing workforce dynamics and food choices have been linked (Lang and Heasman, 2005; Weis, 2007). Women have entered the workforce, and in some cultures, where they acted as the sole authority on food within the household, this role has transformed (Goodman and Redclift, 1991). Now, a variety of actors may act as authority, and influence the food choices of a family. According to Dixon et al. (2014b), the "contractualist, individualized market-driven and 'flexible' regulation of employment associated with the neoliberal project" has forced workers to become desynchronized and dis-embedded from traditional social rituals around food, family and friends (Dixon, Woodman, et al. 2014).

The consumption lens has potential to individualize and stigmatize in the attempt to bring about better environmental outcomes. At the same time, sustainable diets are not as clear as they may appear, providing ample opportunity for corporate actors to use this to their advantage, and create narratives that will reinforce ultra-processed food products in diets. Numerous authors have shown that corporate actors have used nutrition confusion to sell more products (Clapp and Scrinis 2017; Scrinis 2013). With debate over environmental impacts, the potential exists for this practice of perpetuating confusion to exist in the environmental space as well, handing tools to companies to sell products using certain messaging and tactics. Thus, caution should be used when sustainable diets are put into practice, and care should be taken to understand the nuances of what companies are doing to ensure that their products are in fact sustainable.

Conclusions

The concept of sustainable diets turns the focus of efforts to improve the health and environmental outcomes of the food system onto consumption practices. This shift in emphasis is intended to have benefits because little attention has previously been paid to the role of consumption practices in perpetuating certain environmental outcomes in the food system. Sustainable diets can also provide a way of highlighting inequities in the food system and bring attention to underrepresented issues in the food supply chain. However, without careful consideration of the political, social, and cultural drivers of consumption practices, there is a risk that the concept can be interpreted in a way that perpetuates the stigmatization of certain

populations, and the individualization of change. These risks may also hand corporate actors tools to perpetuate the consumption of certain foods while undermining larger efforts to bring about more environmentally-sound, socially-just and healthy food systems.

This chapter establishes the sustainable diets debate as a backdrop for current sustainability discussions by Big Food corporations, along with features of the current global food governance system. Big Food's interpretation of sustainability more broadly, and how that fits within conceptualizations of sustainable diets is the focus of the empirical chapters of this thesis. The need for a focus on Big Food in this debate has been demonstrated in this chapter, due to their role in shaping diets. More importantly, Big Food companies are a major force expanding the consumption of ultra-processed foods globally. With the higher environmental impacts of ultra-processed foods, and their demonstrated negative impacts on dietary patterns and potentially health, the focus on Big Food is again justified. A key takeaway lies in the potential for the intention of sustainable diets to be interpreted in ways that are beneficial to some actors, while being detrimental to health and the environment. The concept of sustainable diets, while still in flux, highlights the importance of considering power and discourse in current ideational debates about the nature of sustainable food systems and diets.

Chapter 3 Legitimizing Big Food: Understanding Governance Challenges in the Food System

Introduction

Governance at the intersection of food and the environment has proven a particularly problematic area for debate. This challenge stems partially from the overlapping nature of food system issues with a variety of other global governance dilemmas including labour, trade, health and the environment. Global food and environmental governance is at the same time perplexing because of the intersecting nature of environmental issues within and beyond the food system. A variety of governance mechanisms and institutions, including the World Health Organization, the Food and Agriculture Organization of the United Nations, numerous commodity roundtables, or the UN Committee on Food Security, seek to deal with the troubling signs of weakness and failure within the global food system, but these governance structures are disputed, while failing to impact change at the scale and speed currently warranted.

The following analytical framework was originally developed for a special issue of *Global Environmental Politics* (GEP) on the GEP of food (Clapp and Scott 2018). This analytical framework provides the conceptual foundation for the thesis, and aids in understanding the current state of governance of food and agriculture, governance of the environment, and the challenges that result from various characteristics of the agrifood landscape. This framework combines theoretical insights from international political economy of the environment, global governance of food and agriculture, and global governance of the environment. These theoretical understandings are comprised primarily of mid-level or middle-range theory, which Meyfroidt et al. (2018, 53) define as:

> originating from social sciences, describes a process developing from observations and analyses of a specific event or phenomenon, building towards explanations of sets of similar phenomena, which can be progressively expanded to other phenomena presenting similar characteristics or linked to other mechanisms present in other theories.

The framework is necessary to examine explanations to the types of questions that a political economy approach entails (IPES-Food, 2017b). Four features of the global agrifood landscape were identified as well as the governance and environmental politics outcomes that tend to result from these characteristics. All of these features overlap and influence each other, and thus, while

distinction is made between them, it is recognized that these connections play a role in how these characteristics manifest in different contexts. The first characteristic is the increasing complexity and distance in the food system that has occurred in the past century. Second, governance is characterized by fragmentation and weakness that crosses issue areas, scales, and geographies. Third, challenges and solutions in the food system are met with polarizing ideational debates about the best ways forward. Finally, uneven power dynamics play an important role in determining whose vision for food and agriculture is realized by influencing the outcomes of debates and governance.

This thesis contributes further by using this framework to focus specifically on how we can better understand legitimacy through these four political and economic features of the global agrifood landcape. Legitimacy and accountability, as a related concept, play a unique role in determining who holds power, what governance is seen as legitimate, and whose ideas are valued in ideational debates. Legitimacy became an important concept to analyze using the four features of the food system landscape given Big Food's legitimacy claims, explored below. For the purposes of this thesis, this chapter lays out the use of legitimacy claims by Big Food. It then outlines four political and economic features of the agrifood landscape in greater detail and provides insights into the consequences of these features for governance outcomes. This chapter also begins to unpack how these features shape the environment in which sustainability strategies, and dietary sustainability are articulated, to illustrate the application of the analytical framework in the following chapters.

The analytical framework utilized in this thesis was developed for the special issue of Global Environmental Politics, before I decided to use it for this thesis. The decision to adopt the analytical framework used in this thesis occurred after the initial coding was completed, and themes had emerged for the types of sustainability activities that Big Food corporations were pursuing. It was also clear at this time that legitimacy was becoming an important concept, where the legitimacy claims of these corporations (outlined below) were identified. The conceptual framework was written as an introduction for understanding the main political and economic characteristics of the agrifood governance system that lead to the particular global environmental politics of agriculture and food that we see. It became evident that this framework

would also be a useful way to analyze the legitimacy claims of these corporations in the context of increasing debate and dialogue on sustainable diets and the complexity of agrifood governance. Furthermore, the characteristics of this framework align well with newer conceptualizations of governance challenges in the food system, including those outlined in the recently published Lancet Commission Report, *The Global Syndemic of Obesity, Undernutrition and Climate Change* (Swinburn et al. 2019).

The framework is a useful tool, used as a heuristic, to think through the many ways that space is created for debate and policy discussions within the global governance of food and agriculture. This framework helps to unpack how this space is created, exploring the features that might create challenges and opportunities for better policy and governance on sustainable diets. Given the political economy and governance foundations of the theory in this framework, it also helps to unpack the ways that certain actors may harness more power and influence in the governance of food, or how discussions about sustainable food systems may lead to certain actors taking on more risk in the efforts to change the food system. As discussed below, legitimacy is particularly important to focus on to understand how opportunities are created by the current agrifood landscape that allow corporate actors make their legitimacy claims.

3.1 Legitimacy and Accountability

Big Food companies are linking their sustainability efforts to their legitimacy to make claims about their role in future food system sustainability and security. Legitimacy can be understood broadly as, "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions" (Suchman, 1995, 574). For the purposes of this thesis, this perception or assumption of desirability is not necessarily steady, constant or consistent across different actors. It is critical to note in this context that legitimacy is fluid and a constantly evolving endeavor impacted by changing global dynamics, social norms, and perceptions. This fluidity creates a set of shifting demands that corporate actors must respond to.

Legitimacy has a variety of important roles in the context of global agrifood governance, particularly related to transnational food and beverage manufacturers and consumers. Three

conceptions of legitimacy are explored in this section. First, some actors are perceived as more legitimate than others within the *governance* landscape and legitimacy of actors and institutions is defined within the governance literature in specific ways. Second, *corporate* legitimacy has unique conceptions and requirements where legitimacy must be earned and is not assumed. Finally, *ideas* can hold legitimacy, but these discursive norms are evolving and subject to change. All three forms of legitimacy are deeply connected to other aspects of the framework, be it legitimacy of ideas and ideational debates, or legitimacy of actors in a weak and fragmented governance landscape. Additionally, all three forms of legitimacy are subject to change, meaning that a corporation is not either legitimate or illegitimate, but that legitimacy is context and concept specific, depending on how legitimacy is defined or measured and who is judging that legitimacy. Importantly, this thesis does not attempt to assess legitimacy, which is impossible without interview data, but to understand how claims to legitimacy can be made by actors, whether they are actually legitimized or not.

Within the international environmental governance literature, legitimacy is seen by Bernstein (2004, 142) as, "the acceptance and justification of shared rule by a community". Buchanan and Keohane (2006, 405) further clarify legitimacy as having normative meaning – where an institution has the *right to rule* – and sociological meaning where an institution is widely *believed* to have the right to rule, which aligns well with Suchman's (1995) definition. Legitimacy has been further delineated, by Bäckstrand (2006) as encompassing: input legitimacy (accountability and transparency) and output legitimacy (effectiveness). This contrast between input and output legitimacy was further clarified to show that input legitimacy is source-based (eg. expertise, tradition, discourse) or process-based (eg. participation, accountability, transparency, fairness), while output legitimacy is outcome-based (eg. effectiveness, equity) (Karlsson-Vinkhuyzen and McGee 2013). These concepts help to understand and evaluate complex legitimacy claims by Big Food corporations, and the sources of legitimacy that may back those claims up.

The legitimacy of an organization, company or governance institution is made vulnerable by questions of accountability—who, to whom, about what, through what process, by what standards, and with what effect (Mashaw 2006)? These questions become particularly

challenging with the additional ask of "how to call to account a constellation of regulators" (Black 2008)—many of whom have vested interest in the outcomes of regulation for their legitimacy.

Legitimacy is at the same time critical to a transnational corporation's ability to conduct business, grow, and be profitable in multiple markets. Corporate legitimacy scholars working in the fields of business, management, and marketing use measures such as favourability of news reports, earnings forecasts, and consensus among financial analysts to quantify legitimacy (Cormier and Magnan 2015). They focus on the social acceptance or 'license' of a corporation that gives it the ability to operate by appearing to conform to norms of accepted behavior (Pollach 2015). Business scholars explore the many ways in which corporations attempt to achieve legitimacy through efforts to manage norms, associate with legitimate institutions and standards, anticipate changes in norms, and in the discursive strategies used to communicate their practices (Dowling and Pfeffer 1975; Joutsenvirta and Vaara 2015; Pollach 2015). However, these authors do concede that evolving global dynamics create a set of changing demands that corporations must respond to, making legitimacy a constantly evolving endeavor (Scherer, et al. 2013).

Accountability questions emerge as a consequence of legitimacy challenges. "Accountability politics" seek to hold all parties responsible for the actions they take, and the commitments they have made. However, in the evolving era of global environmental and food governance, non-state governance actors are oftentimes required to go beyond public institutions' efforts. Governance institutions that are led by governments, whether they be multilateral, or even at the local level gain a certain amount of legitimacy through democratic accountability. They are theoretically accountable to the public that votes them in and entrusts them with a role in governance. However, they can move slowly, and be reluctant to change based on other pressures, such as economic growth. Thus, private accountability structures like the Global Reporting Initiative (GRI) have proliferated as part of accountability relationships that help corporate actors build and validate perceptions of legitimacy (Auld and Gulbrandsen 2010; Black 2008). The accountability relationships that are created closely connect to ideational debates and power, as they entail, "discursive interactions, which draw on and thus reproduce particular

structures of meaning" (Black 2008, 27). Rather than continue to promote ever-increasing ways of conveying accountability, it is necessary to explore how different accountability relationships are mediated and negotiated through various corporate actions (Black 2008). Black (2008) warns that in trying to create new legitimacy communities, organizations are forced to respond to multiple legitimacy and accountability claims which can create what Koppell calls "multiple accountability disorder" (2005).

Ideas can also hold legitimacy, with their perceived legitimacy often a source of ideational debate. De Wit and Iles (2016, 2) differentiate between thick and thin legitimacy, arguing that conventional agriculture holds "'thick legitimacy': authority that cannot unravel easily because it is multi-stranded and broad-based." On the other hand, alternatives like organic agriculture hold only a thin legitimacy that can unravel easily if market demand or policy interventions change (De Wit and Iles 2016, 1). The consequence of the legitimacy of certain ideas over others is that many mechanisms of sustainability will continue to perpetuate norms with thick legitimacy, making only small improvements to the status quo, while ignoring the opportunities that may be made available by pursuing alternatives with so-called "thinner" legitimacy.

Contests over legitimacy and accountability of institutions, corporations and ideas benefit from and create many of the consequences explored as features of the agrifood landscape that influence governance, below. Legitimacy became an important concept for this study. Corporate actors, the governance mechanisms they participate in, and the ideas they put forward on sustainability can all lose legitimacy incredibly quickly. A sustainability leader one day can be the focus of consumer boycotts and non-profit advocacy campaigns the next (Dauvergne and Lister 2013). This shifting legitimacy is actually what makes Big Food sustainability efforts in the context of the political economy of agrifood so intriguing and important to study.

Within the analytical framework, some general trends in the way legitimacy interacts with the four features emerge. Distance and complexity can create space for certain actors to seek to legitimize themselves if they have exclusive knowledge within a supply chain – making the concepts of input and output legitimacy more important to understand complex dynamics of legitimacy and accountability within the context of distance. At the same time, distance and

complexity can make accountability more challenging, as legitimacy of processes can be harder to demonstrate. Weak and fragmented governance also results from legitimacy contests with a variety of players vying to become the legitimate actor in a governance regime. Ideational debates perpetuate legitimacy challenges for ideas and institutions, while power allows certain actors to claim or hold legitimacy. Corporate power plays an important role in the ability of these actors to be seen as legitimate and accountable, and to partner with more legitimate actors.

The role of legitimacy is a prominent consideration in the context of this work, as companies have increasingly made legitimacy claims about their role in contributing to future food security and sustainability, making foods more available, affordable, sustainable and healthy. Many companies have made immense claims about how they are contributing to food security and sustainability issues, tying their work to the SDGs and taking on issues often seen to be outside the scope of their business mandate. Table 3.1 demonstrates these claims for each of the companies, with emphasis added to the claims in bold and some ties to future growth emphasized in italics.

Table 3.1: Selected Legitimacy Claims of Big Food Companies 2016-2017

Company	Claim
Associated British Foods	"Associated British Foods started out as a bakery business in 1935. Over the past 82 years, we have grown and evolved into an international food, ingredients and retail business. A great deal has changed in that time but what has remained a constant is the essence of Associated British Foods. **By this, we mean the ethical way in which we operate. Our intention has always been to do the right thing for our people and the wider community, believing that in feeding and clothing millions of people we do good every day.**" (ABF, 2017, 1)
The Coca-Cola Company	"Today's consumers care deeply about the social and environmental impact companies have on the world, and many are willing to spend more on products and services from companies committed to a positive social and environmental impact. These same consumers also expect us to be responsible corporate citizens that **positively impact their local communities**. **Everywhere we operate, we do so at the pleasure of the communities we serve. That's why we will always strive to create a positive impact and provide meaningful solutions. We understand that our social license to operate must be earned day-in and day-out".** (Quincey, 2017)
Danone	"We might have devoted this first part of our annual report to the many challenges the world will face in coming decades–the demographic crisis, the environment, public health, limited resources and many others. But we

	have chosen instead to focus on initiatives that give us hope. Ideas that show us that feeding 9 billion people in 2050 isn't an unachievable dream. That **it's possible to make food and beverages that meet not only the nutritional challenges, but the environmental, economic and social ones as well"** (Danone 2017, 10). "With our new company vision "One Planet. One Health" and ambition to become a global B Corp, we carry forward our mission to **"bring health through food to as many people as possible"** and our dual *project for business success and social progress*". (Danone, 2018, Vision and Ambition)
General Mills	"In order to feed a growing global population, we have to be good stewards of our earth – from farm to fork and beyond. We need a stable climate, clean water, healthy soil, strong ecosystems and thriving farming communities" (General Mills 2017, 1). "At General Mills, we serve the world by making food people love. We do this by embracing our five pursuits, which are at the heart of our company. **Put People First. Build a Culture of Creating. Make Food with Passion. Earn People's Trust. Treat the World with Care".** (General Mills, 2018, 2)**.** "We're facing unprecedented change in our industry and on our planet, and expectations of food companies have never been higher. This requires transformation at every level, from how we source ingredients to how we make our products to how we engage with our consumers. While transformation brings with it many challenges, we also see *opportunities for leadership, innovation and growth*" (General Mills, 2018, 1).
Kellogg Company	"Every day, Kellogg employees work together to fulfill our vision of enriching and delighting the world through foods and brands that matter. The reason they matter is that we don't just make delicious, high-quality foods. We're also **focused on making a difference**. That's why we are **dedicated to nourishing with our foods, feeding people in need and nurturing our planet**, all while living our founder's values" (Kellogg Company 2017a, 2). "But it's not enough to want to do good. We must hold each other accountable to passionately work to make a difference. That's why we're as **dedicated to fighting hunger and feeding potential** as we are to *delivering business success*. Nowhere is this more evident than our global commitment to create 3 billion Better Days by the end of 2025 as part of our Breakfasts for Better Days purpose platform" (Kellogg Company, 2017, p. 4).
Kraft Heinz	"We are experiencing unprecedented challenges in our industry today—from resource scarcity and climate change to food insecurity and an ever-evolving consumer. That's why we're more active than ever before in advocating for the sustainable health of our people, the planet and the communities where we live and work. It's the right thing to do for the *longterm growth of our Company*, and it's the right thing to do for **the well-being of society at large"** (Kraft Heinz, 2017, 4)**.**

Mars	"We developed our Sustainable in a Generation Plan to *grow in a way we can all be proud of*. Combining business principles with science to shape our approach, we are focusing on three interconnected ambitions that foster our commitment to investing in the future, **taking a long-term view and leaving the world in a place for future generations"**.(MARS Inc. 2017a)
Mondelēz	**"We know that our success is directly linked to enhancing the well-being of the people who make and enjoy our products, the communities we serve and the planet as a whole.** That's why in 2013, we launched our Call For Well-being platform — our call to action for colleagues, suppliers and partners to deliver meaningful change. Since then, the world around us has changed and so have we. *In January we introduced our updated Strategy Globe, which is an evolution of our strategic focus to achieve our growth ambitions — to be the best snacking company in the world. It helps us lead with purpose and values, to deliver balanced growth,* with a keen focus on our three goals: grow our people, grow our business and grow our impact. In this context, we have evolved our platform as well. Our new platform, *Impact for Growth*, is a natural outcome of our Call For Well-Being, going from a "call to action" to a declaration of how our business success is inextricably linked to positive social impact. It is a more focused approach to driving our company's growth and delivering positive change." (Mondelēz, 2017, 3)
Nestlé	"Every day, Nestlé touches the lives of billions of people worldwide: from our employees to the farmers who grow our ingredients and the families who enjoy our products; to the communities where we live and work; as well as the natural environment upon which we all depend. Guided by our values rooted in respect, we work alongside partners to create shared value – **contributing to society** while *ensuring the long-term success of our business.*" "Creating Shared Value (CSV) is our way of *delivering a long-term positive impact for shareholders* and **for society**, through everything that we do as a company". (Nestlé, 2016)
PepsiCo	"PepsiCo is **working to create a healthier future for people and our planet**. Our Performance with Purpose 2025 Agenda is designed to deliver needed change across our company, value chain, industry and world" (PepsiCo 2017, 1).
Unilever	"Together **we can change how the world does business"**. "We are at a turning point. **Only businesses that help people and planet thrive will succeed. We have to scale our impact through partnership, collaboration and trust**. – Paul Polman, former CEO"

	"Our future lies in creating an ecosystem for change – a network of people embracing our power to ask: can we do more? – Afra Abdeen, Assistant Sustainable Business Manager, South East Asia and Australia" *"We are proving that responsible business is good business. Here's how…MORE GROWTH.* Our own research shows that over half of all consumers already buy or want to buy sustainably. This is why we developed our 'sustainable living' brands, which have a clear purpose relating to a social or environmental concern and contribute to the USLP". (Unilever 2018e).

Commonalities worth noting are apparent across the claims made by these companies. First, Big Food companies are clearly positioning themselves as part of the answer to questions of food system sustainability. They are conceptualizing their role in these reports as going beyond business, to making a positive impact on the world through their activities. This is a noteworthy shift in the way that businesses perceive themselves, and sell themselves, and is one of the reasons that understanding the implications of their sustainability strategies is so important. Second, we see that many of these companies are connecting their legitimacy claims to their growth. Being understood as a legitimate actor in the food system is the first step to their profit-making. Unilever, arguably one of the most ambitious companies on sustainability, is particularly vocal on this point, consistently tying the growth of its business to its most health, wellness, and sustainability-connected brands, known as "Sustainable Living Brands".

3.2 Complexity and Distance

The food system is incredibly complex and increasingly features long distances from farm to fork (Clapp 2016). Long supply chains are comprised of various moving parts including: production, transportation, storage, processing, retail, and consumption. These supply chains introduce immense distance into the food system, which sparked debate about food miles and local food in the early 1990s (Coley et al., 2011; Iles, 2005). The distance in the food system also creates complexity, with space for larger numbers of actors in the food system that impact the nature of production through to consumption. These actors can include small-scale farmers, non-governmental organizations, government entities, and corporations – all with ideas about how the food system should be shaped. An increased number of actors means that space is created for legitimacy contests over solutions, responsibilities, and ideas about the future direction of the food system. Along with these many actors, dynamics like weather and finance also affect

outcomes in the food system, and are often themselves manipulated by humans, with unpredictable fluctuations in commodity market prices as an example (Ghosh 2010; Jarosz 2009). Agriculture also features flexibility, with crops being used for textiles, fuels, and feed creating complex supply and demand dynamics that can bring distinct challenges to food security and sustainability debates (Dauvergne and Neville 2010; Gillon 2016). This phenomenon also creates legitimacy challenges where contests over the best use of resources exist.

The complexity of the food system is brought about by the same phenomena that create physical and mental separation between production and consumption (Clapp 2015; Princen 2001, 2002). Physically there is increasing distance in the geography of where something is produced and where it is consumed, but there is also mental distance between these places brought about by increasingly urbanized populations and dwindling numbers of farmers in high-income countries. Mental distance is also created by the amount that finished food products are removed from their raw state (Princen 2001), an essential consideration for diets increasingly featuring ultra-processed foods. Increased distance in the food system creates opportunities for powerful actors to extract profit, gain control and externalize costs with severed feedback loops and lack of information (Princen 2002). This context creates questions of responsibility for environmental and social harm in the food system, and in turn weakens the ability of actors to mount campaigns of resistance (Clapp 2014, 2015). Legitimacy is also impacted by this distance. Legitimacy becomes harder to demonstrate with disconnected products and production. Simultaneously, distance can work to the advantage of certain actors where space is created for them to legitimize their actions by creating mechanisms to demonstrate accountability within this distanced context – eg. private certifications and third-party audits.

Complexity has important implications for considering the sustainability of diets. Part of the appeal of sustainable diets is in changing consumption as a means to improve the environmental and social performance of the food system overall. However, there is debate over the best intervention points along complex supply chains to achieve results. Opportunities for powerful actors to shape narratives around the most effective place of intervention are created, and as a result, the focus can move from the environmental consequences of production practices, the effects of distribution, or as in sustainable diets, on consumption.

Governance initiatives have emerged in a variety of spaces along these supply chains, with targeted farm-level policy on increasing climate-smart agriculture (Newell et al., 2018; Newell and Taylor, 2018) or digital farming (Bronson and Knezevic 2016). Corporate activities along supply chains including certification schemes and private regulation have increased rapidly, with implications of this "supply chain sustainability" outlined in Chapter 5 (Auld 2014; Fortin 2013; McKeon 2015). The ability to question, and verify the outcomes of these governance efforts is limited because of physical and mental distance, which has led to a rise in third party certification with its own unanswered questions and issues (Hatanaka and Busch, 2008; LeBaron et al., 2017). The focus on value-added commodities (eg. coffee and cocoa) while largely ignoring systemic issues follows from increasing private commodity certification, but many companies have recently turned to focus on staple crops like soy, sugar cane, and cereals (Freidberg 2017b).

Complexity and distance devalue food itself, with increasingly processed food losing vitamins and minerals that are then added back in during processing (Lawrence 2013). Simultaneously, food systems value the profit-making activities that occur along the supply chain over other outcomes (Princen 2002). Vulnerable but profitable commodities are targeted for research and governance intervention, while the larger implications for food system environment and health outcomes are overlooked. Simultaneously, governance and policy efforts in some countries have focused on increasing local and national food economies to combat globalized food supply chains (Lang and Heasman 2015; Marsden 2013).

Consumption focused policies for improving sustainability have begun to emerge with attention directed at national dietary guidelines (Gonzalez Fischer and Garnett 2016), the retail space, labelling, and taxation of certain ingredients, nutrients, or products (Bailey and Harper, 2015; Wellesly et al., 2015). The wide variety of proposed governance mechanisms highlights the debates that have occurred over the best leverage points for policy, resulting from increasing complexity and distance. The emphasis on national dietary guidelines has also underscored the country and context-specific nature of these policies, as well as, the power dynamics, ideational debates and narratives that emerge when key economic sectors are the target for policy change

(Freidberg 2016). Distance and complexity can make it incredibly challenging for consumers to understand sustainable eating choices. As people continue to move to cities, they are disconnected from food production, which is exacerbated by longer and more complex supply chains. As Princen (2001) points out, there is little ability for consumers to actually go and check to see that production practices are as they are advertised. Information provided on labels may not be sufficient or competing certification labels may add to confusion over the best choice for certain products, highlighting a challenge of the consumption focus of sustainable diets. Distance and complexity in the food system play a key role in creating the challenging governance conditions that exacerbate the other phenomena that make up this framework.

Technical standards developed from the 1930s onwards as a result of growing complexity and distance in the food system, at the same time perpetuated this phenomenon by creating uniformity in the way that commodities were understood by species and grade. These standards allowed greater volumes of grains to be grown, stored, traded and processed by giving more control to governments and food companies to stipulate how these commodities should move through the system, thus allowing supply chains to become more complex while ensuring quality control (Busch 2013; Cronon 1991; Freidberg 2017a). De Wit and Iles (2016, 4) offer a variety of examples including white bread and ground meat to show that consumer preference for these products was cultivated through "co-evolving technologies for production, processing, transportation, retail, and marketing". These features have endured for a variety of reasons, including increased food trade, and the way that industrial agriculture has been "internalized by most people within food systems as universally applicable and empirically true" (de Wit and Iles, 2016, 4). Consumers have grown accustomed not only to having a variety of processed and packaged offerings to choose from, but to having little seasonality in produce, and being able to buy a variety of foods with reliable selection every time they shop.

Complexity and distance in the food system make it challenging to see the full picture, which permits links to be obscured and the root causes of environmental, health, and social issues to go unattended to. It also makes the challenge of teasing out consumption issues from production incredibly difficult, and makes the need for holistic governance apparent but challenging. Here, the links to other aspects of this framework can be easily seen when focusing on legitimacy.

Legitimacy of actors can create opportunities for them to shape the way that this distance and complexity is dealt with. It also creates openings to engage in ideational debates about where the best place is to intervene and how to go about change. The obfuscated connections between root causes and outcomes also contribute to weak and fragmented governance.

3.3 Weak and Fragmented Governance

Global governance initiatives meant to tackle ecological and social sustainability issues in the food system are often weak and fragmented (Biermann et al. 2009; Zelli and van Asselt 2013). The United Nations Committee on World Food Security (CFS) is the body assigned to coordinate policy recommendations and guidance for food security governance in the international arena but it often competes for authority on the issue with economic governance bodies and mechanisms whose rules also matter for food security, such as the World Trade Organization, the TRIPS agreement and G20 (McKeon 2015). The overlapping nature of issues including labour, social, cultural, sustainability, and the governance mechanisms meant to manage them means that it can be incredibly challenging for any one organization to fully capture the complexity required. The fragmentation of governance mechanisms also perpetuates and is perpetuated by longstanding silos in science, policy, and economics. For example, the Codex Alimentarius has a very industry and science-focused approach to creating food standards that ensure safety and "promote fairness in international food trade" (Codex Alimentarius 2016). This also connects to the legitimacy of ideas, where science has a powerful perceived objectivity. The Rome Declaration on Nutrition and its Framework for Action developed out of the 2nd International Conference on Nutrition (ICN2) asserts the right to food, providing a number of political options for working towards the goals of the declaration, while attempting to be more holistic. However, the vague recommendations are open to a variety of interpretations. For example, Recommendation 1 is, "Enhance political commitment and social participation for improving nutrition at the country level through political dialogue and advocacy." (ICN2 2014, 2). While admirable, this recommendation is largely meaningless in terms of measureable outcomes.

Simultaneously, a wide-variety of environmental initiatives exist that affect food system sustainability. These governance initiatives include state-based agreements, including the United

Nations Framework Convention on Climate Change (UNFCCC), the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, the Rotterdam Convention on Prior Information Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Stockholm Convention on Persistent Organic Pollutants (POPs). Private and voluntary governance has also proliferated in this space with new actors playing a role in governance. Certification schemes that govern value chains of particular commodities have been particularly prevalent, including fisheries (Marine Stewardship Council), palm oil (Roundtable for Sustainable Palm Oil), sugar cane (Bonsucro) and soy (Roundtable on Responsible Soy). Broader schemes that cover a number of commodities have also grown (eg. Rainforest Alliance, Fairtrade Certification).

At the retail level, standards have been created to ensure certain qualities that in turn impact environmental outcomes at the production level (Global GAP). New players including the World Economic Forum (WEF) and a number of business initiatives have played an increasing role in determining new action on environmental governance in the food space. At the same time, for some issues, there are few, if any, governance initiatives for guaranteeing sustainability (Clapp 2018).

These relatively "upstream" governance initiatives matter for consumption governance, because they are part of what sets the stage for the conversations that are possible and products that can ultimately end up in front of consumers. The upstream governance creates space for certain consumption governance ideas to become legitimized. Fuchs and Lorek (2000) explore direct and indirect influences on consumption. Direct influences are lifestyles, tastes, and knowledge, whereas indirect influences are factors affecting sustainability before the household ever makes a decision. In other words, governance mechanisms that decide what is considered sustainable, or corporations that create private standards, indirectly influence the sustainability of consumption choices at the individual level (Fuchs and Lorek, 2000). Fuchs and Lorek (2000) argue that indirect influences do not receive as much attention but appear to be as powerful a factor in consumption. They note,

> indirect influences trickle down to the sustainability outcome of household consumption due to their influence on the supply of products and services from which households choose. For food

> consumption, this indirect impact of globalization primarily affects the sustainability of agricultural production and the environmental burdens imposed at other stages of the product chain such as food processing (Fuchs and Lorek, 2000, p. iii).

Global governance initiatives act as indirect influences attempting to mediate the outcomes of a globalized world.

The weak and fragmented governance setting presents incredible challenges for increasing the sustainability of diets. As corporate actors and governments both seek to address environmental problems, establishing new certification schemes has become ever more popular, which has resulted in a noisy landscape of governance initiatives touching on various aspects of food and agriculture (Derkx and Glasbergen 2014). Numerous challenges emerge from competing schemes, including a race to the bottom which lowers standards to lure signatories. This fragmented landscape can also create opportunities for forum-shopping by actors interested in maintaining perceived legitimacy with fewer costs or changes (Murphy and Kellow 2013; Raustiala and Victor 2004) Scholars have also critiqued the growing acceptance of market-based initiatives legitimized by civil society, but with often weakened governance on these issues (Dauvergne 2016).

Weak and fragmented governance overlaps with complexity in creating challenges for understanding the most important leverage points for intervention, what new governance areas are required or where existing governance needs to be better integrated or legalized. Fragmented governance can also make it easier for certain actors to point to a variety of efforts that they are making without an understanding of the overall impact of their actions outside the context of those individual efforts. Legitimacy as a lens illuminates how actors and ideas compete for space in weak and fragmented governance landscape and how these contests may lead to even more fragmentation, partially resulting from the complexity of the system. While weak and fragmented governance is currently a challenge to realizing sustainable food systems, there is opportunity to bring together diverse actors and ideas to collaborate and coordinate efforts better. This work requires a diversity of ideas at the table, but highlights another challenge that emerges from polarized ideational debates about the way forward for food and agriculture.

3.4 Polarized Ideational Debates

Debates continue about the best way forward for creating sustainable food systems that serve all. These debates cover the entire supply chain. Some advocate for the continuation of a more industrialized system of food production, while recognizing the need for some changes. This would include the use of genetically modified organisms (GMOs), industrial chemicals, sustainable intensification, and digital farming, with the intention of increasing efficiencies and total food output (Collier 2008; Garnett et al. 2013; Godfray and Garnett 2014; Paarlberg 2010). These same people often promote increased global food trade to exploit efficiencies of scale and place to boost production (Baldos and Hertel 2015; Hertel 2015). Many are quite critical of these proposals and call for more transformative change that includes smaller-scale diversified production based on agroecological principles and localized distribution (Holt-Giménez and Altieri, 2013; IPES-Food, 2016; van der Ploeg, 2014). Advocates of this approach are vocal about its advantages, highlighting the improved biodiversity, reduced reliance on synthetic chemicals and potential to mitigate climate change (Koohafkan et al., 2012; Vandermeer and Perfecto, 2017). These polarized debates can lead to contests over who is seen as legitimate and what ideas are then legitimized.

There is also debate over the best ways to make change, and the leverage points that exist. While much of the focus has been on increasing production historically, some are turning to other areas of the food supply. Some scholars have focused on reduction of waste throughout the supply chain (Bloom 2010), while others have emphasised technical issues, such as reducing transportation and refrigeration emissions (Tassou et al. 2009). Simultaneously, many are turning to more holistic visions of the food system, and advocating for change throughout, from production to consumption. Authors on sustainable diets have argued that this all-inclusive vision is demonstrated in sustainable diets, as it takes a broad approach to changing diets in an effort to transform the ways that food is produced, delivered, and sold (Lang and Mason 2017). However, it is at the same time challenging to create sustainability concepts that can truly capture all of the intricate and connected challenges of the food system, and as demonstrated in Chapter 2, this creates its own unique challenges.

Debates about how and where to make change in the food system have important ramifications for what is advocated for in international policy and governance arenas, and what is seen as a legitimate method of governance. The many arguments presented are based on some form of scientific evidence, but this evidence comes from different disciplinary traditions and thus, concepts, methods and language, which speaks to the legitimacy of certain ideas, and disciplines in policy circles. The example of 'efficiency' illuminates this divide, with some advancing a large-scale, science and technology-based vision which relies on economics, technology studies and concentrates on cost and resource efficiencies. Conversely, small-scale diverse and complex agriculture is supported by those scholars and civil society organizations that tend to draw on ecology, environmental social sciences and prioritize ecological and energy efficiencies that reduce total throughput of resources (Clapp 2017; IPES-Food 2016). Chapter 4 will demonstrate the importance of these debates, and the contested nature of scientific evidence and objectivity.

The consequence of fractured debates on food and agricultural sustainability is a political landscape that becomes incoherent and unproductive. Advocates of the different approaches are not willing to fully engage in productive dialogue because they cannot agree on basic assumptions about where to begin and the scale of what needs to be done. Such a stalemate was displayed at the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) where a scientific consensus could not be agreed on for pathways forward in agriculture and industry and civil society walked out (Feldman and Biggs 2012; Scoones 2009). The challenge of coming to consensus in this forum stresses the highly charged context in which debates about policy and governance for sustainable food systems are occurring.

Sustainable diets have likewise led to complex debates over the various bodies of evidence that should be considered, what areas to focus on, and what aspects of sustainability are important for dietary change. As seen in Chapter 2, differences have emerged that emphasize the divide between actors. The debates around meat and dairy thus far illuminate some of these differences. Academic literature has focused on quantifying the impacts of diets through life cycle assessment (LCA) (Carlsson-Kanyama and González 2009; Eshel and Martin 2006; Tilman and Clark 2014; Tom et al. 2016b), what changes would mean for ecological markers and health

(Scarborough et al. 2012; Springmann et al. 2016b), as well as some preliminary work on the cultural and social challenges to changing diets (Macdiarmid et al. 2016).

As seen in Chapter 2, civil society organizations have focused their efforts on collaboration across the food supply chain, as well as advocacy campaigns that aim to bring sustainable diets to the mainstream (see Barilla Center for Food and Nutrition, WWF). At the same time, the meat industry has worked to actively undermine efforts to reduce meat consumption, funding research that argues for efficiencies and reduced emissions from concentrated animal feeding operations (CAFOs) and against grass-fed operations (Capper 2012). These arguments ignore the other ecological benefits from grass-fed operations, and this became a source of intense debate during efforts to incorporate sustainability in to the U.S. Dietary Guidelines in 2015 (Freidberg 2016). Industry has also tried to shift blame away from meat, pointing to emissions from other sectors, while skewing data to create narratives that vegetarian and vegan diets may have greater impacts than omnivorous diets (Fry et al. 2016; Mitloehner 2015; Nosowitz 2015). The wide array of narratives that have occurred around the concept meat consumption alone in the sustainable diets debate is indicative of the ideational debates that play out across the food chain.

These debates bring up questions around legitimacy of knowledge and highlight the need to incorporate diverse actors and ideas, and demand discussions that seek to include various voices rather than speaking past each other. Knowledge legitimacy and norms also highlight the interconnected nature of these polarized ideational debates with the issue of power. Solutions proposed by actors that advocate further industrialization of food systems, hand over a larger role to those with technological and financial capacity to take advantage of economies of scale, generate data, and deliver fixes that increase the sustainability in ways that they see as effective (eg. supply chain traceability, food fortification, and precision farming techniques). In advancing these forms of sustainability, those most affected by these choices become marginalized in identifying problems and proposing solutions (IPES-Food 2017b).

3.5 Uneven Power Dynamics

Perhaps more than any other phenomenon, uneven power dynamics between actors and regions shape the food system and limit possibilities for alternative visions. Power is used to, in a way to

legitimize certain ideas and actors, swaying narratives and shaping knowledge, to influence policy and to be seen as viable actors in the future food system. Extreme corporate concentration exists throughout the food system from production to distribution (Howard et al. 2016). The food system has been characterized as an hourglass where 7 billion consumers and 1.5 billion producers sit on either side of a chokepoint controlled by a handful of powerful corporations (Oxfam 2013; Sage 2011, 58). While producers and consumers make up a larger portion relative to corporate actors in the middle, they hold little power to make decisions about the food system. At the international level, inequity between rich and poor countries impacts influence in policy settings like the G20, G8, WTO, and World Bank (Margulis 2013).

Important literature on power has evolved in the fields of sociology and political science (Bachrach and Baratz 1962; Dahl 1957; Lukes 1974). A variety of authors have built on this literature, creating frameworks for understanding how corporations may use and retain power (Clapp and Fuchs 2009; Fuchs 2007). Clapp and Fuchs (2009) use a power framework with three typologies of power. The first is instrumental power, summarized by Dahl (1957), whereby; "*A* has power over *B* to the extent that he can get *B* to do something *B* would not otherwise do" (203). Instrumental power is dependent on the individual financial, organizational or human resources of an actor, and its ability to access the decision-makers to make use of those resources (Clapp and Fuchs 2009, 8). Instrumentalist approaches to power are useful for assessing direct influence relationships of actors; however, they have a number of inadequacies in assessing the overall power of business in GEG and GFG.

Structural power focuses on the input side of policy and politics, and the way in which different actors are able to obtain and wield agenda-setting power. Fuchs (2007) notes that this type of power is harder to study, as it may not be obvious to outside observers. An example of this power is corporate ability to move jobs and investments away, a power held with no requirement to voice it. Continued debate has occurred on the extent of agenda-setting power corporate actors wield (Fuchs 2007). However, increasingly through the use of private governance mechanisms, corporations are able to control networks and resources in order to adopt, implement and enforce rules (Haufler 2001). Furthermore, when these rules become endorsed and thus legitimized by governments and international organizations like the WTO, business actors are given power to

continue to determine and enforce rules made without public input. While the second face of power provides a better understanding of direct conflicts and capabilities of actors, it still does not adequately describe the normative setting in which decisions and non-decisions are created (Fuchs, 2007).

Discursive power is increasingly being examined in policy and politics as it can play an influential role in how decisions are negotiated. This type of power examines how problems are characterized and presented, and thus what options are seen as viable. In other words, "some definitions of issues are organized into politics while other definitions are organized out" (Hajer 1995, 47). Clapp and Fuchs (2009) expand on this notion, providing two major insights from discursive perspectives. First, drawing on Lukes (1974), actors can use this type of power to pursue perceived interests by shaping discourse and framing issues and debates for the public (Clapp and Fuchs 2009). Second, legitimacy and discourse are tightly connected. To influence discourse, an actor must have political legitimacy, which is gained through a variety of means in complex relationships. This ideational power has been well-studied in the governance literature with a variety of authors noting the importance of framing ideas for governance outcomes (Clapp and Meckling 2013; Fuchs et al. 2016; Grant and Keohane 2005; Sell and Prakash 2004).

However, power does not guarantee the exertion of influence in any given scenario. Indeed, cases where corporate actors have conceded to civil society, governments or other business interests are numerous, demonstrating the agency of these other actors to shape governance outcomes (Clapp and Meckling 2013). Betsill and Corell (2007) note that power and influence are often conflated and ill-defined. They argue that a distinction should be made, and draw on (Cox and Jacobson 1973) to define power as *capability*, which "can be calculated for an actor at a particular point in time" (Betsill and Corell 2007: 22). This conception of power is opposed to influence, which "is seen as an emergent property that derives from the *relationship between actors*" (Betsill and Corell 2007). This relational conception of power highlights the dependence of interactions in determining outcomes of power. It also highlights the importance of the concept of legitimacy for understanding when powerful actors may have influence and when their legitimacy is weak, they may not be able to wield their "calculated power". Furthermore, it highlights the issue of *autonomy,* or the ability to *not* be influenced, which plays an important

role for governance. Autonomy is defined as, "the extent and degree of an entity's …operational independence [and] …the 'degree' of the legal and pragmatic distance that exists between the institution and the directing influence of nation-States …other (non-State) factors" (French, 2009: 257). Cafaggi and Pistor (2014) note that private autonomy is a part of self-determination that is critical in understanding the distributional effects of transnational private regulation. In the space of transnational private regulation, questions arise not only about the ability of individuals to avoid influence but of corporations to avoid any one sphere of influence through diffuse mechanisms of governance.

Power has not been explored extensively in the consumption literature but recent work suggests that this is an important element to consider (Fuchs et al. 2016). Fuchs et al. (2016, 301) note in their conclusion that,

> Power is intrinsic to human interaction, to social organization and to the shaping of societal change. Power is essential in understanding what drives overconsumption and creates barriers against attempts to make it sustainable, and in identifying where potentially effective intervention points may exist. Sustainable consumption and absolute reductions research and action need to consider who sets the agenda, defines the rules and the narratives, selects the instruments of governance and their targets, and thus influences peoples' behavior, options, and their impacts.

With the case of ultra-processed foods, a number of points exist in which power is shaping the way these foods are consumed, who is consuming them, and how efforts to reduce their consumption (or their health and environmental impacts) are perceived. The following chart explores some of the ways that Big Food corporations exercise power in the food system to encourage consumption of ultra-processed foods. This chart utilizes a power framework that is based on the work of Fuchs (2007) and (Clapp and Fuchs, 2009). It is based on a similar thought exercise focused on meat by Fuchs et al. (2016) and uses a review of literature to establish an understanding of key points where power is used to reinforce the consumption of ultra-processed foods. It is not meant to be exhaustive but to begin to think through the many ways that these intersecting powers influence the availability of foods and choices offered, shaping food environments. In the larger framework that outlines aspects of governance, power is only one part. This sub-framework provides a more detailed way to think through dimensions of power. I will refer back to this chart and in the Chapter 7 (Table 7.1) to include findings from this research and the implications for governance and sustainable eating.

Table 3.2: Power in the Food System that Encourages Consumption of Ultra-Processed Foods

	Structural Power	Instrumental Power	Discursive Power
Ingredients – Production		Lobbying to keep prices of key commodities down through subsidies etc. – corn, soy (Freeman 2014; Kammer 2012)	
Sourcing – Ingredients and Refining Ingredients	Grain traders and processors, ingredient makers (often the same people) concentration (Clapp 2018; IPES-Food 2017a; S. Murphy 2008)	Lobbying to limit regulation on labour, environmental standards and to keep private and voluntary governance mechanisms. Lobbying on the definitions for labelling of ingredients – eg. natural and clean labels.	Ingredient companies selling ingredients that can help manufacturers reformulate to make food healthier, keep labels clean, add protein, last longer, taste better etc. (Blytham 2015)
Production	Increasingly consolidated and concentrated industry (IPES-Food 2017a)	Lobbying for lower corporate taxes (particularly in 2017 in the U.S.) (Center for Responsive Politics 2018)	
Retailing	- Capital concentration: few supermarket chains jointly control large market shares leading to - Buyer-driven supply chains (Burch and Lawrence 2007; IPES-Food 2017a) - Retailer driven food governance through private certification and auditing systems (Fuchs et al. 2016, 305)	Lobbying for/against product standards, labels (Nestle 2015)	- Consumer sovereignty and choice (Princen 2010) - Promotional efforts focused on unhealthy foods (Ravensbergen et al. 2015)
Consumption	- Abundance of ultra-processed foods in built environment - Ultra-processed foods making up 60% of food consumption in developed countries, and growing in LMICs (Monteiro et al., 2013b) - Efforts to reach populations not served by traditional retail outlets (Jacobs and Richtel 2017; Mahajan 2016; Nestlé 2010, 2017a)	- Lobbying in the name of consumer interests on price, choice, safety, quality - Lobbying for/against dietary guidelines changes (DGAC in U.S., see Freidberg, 2016) - Lobbying against taxes that are meant to change consumption patterns (Mason 2016)	- Creating products to fit changing workforce dynamics and a culture and lifestyle of eating on the run, reduced cooking times, snacking etc. (Dixon, Carey, et al. 2014; Dixon, Woodman, et al. 2014; Lang and Heasman 2015; Weis 2007)

Resistance to Change	- Funding to research in nutrition, health (Kearns, Schmidt, and Glantz 2016; Mozaffarian 2017; Simon 2015).	- Lobbying against regulations that provide better information (eg. GMO labelling, nutrition labelling) (Hemphill and Banerjee 2015; Julia and Hercberg 2016; Lipton 2015; Scrinis and Parker 2016)	- Promoting improvements to products as the source of change needed for nutrition, environment (Scrinis 2016).

The power dynamics in the food system related to the consumption of ultra-processed foods, shown above have many implications for the ways that sustainability strategies are articulated by Big Food. As alluded to in the discussion of ideational debates, the capacity of certain actors to control the narrative plays a key role in diagnosing problems and advancing solutions. Once established, narratives that leave certain actors out of the discussion, or options off the agenda can become powerful in their own right and remain very hard to challenge. The ubiquity of certain foods in the market, and the cultural power of those foods, as well as cultural concepts such as consumer sovereignty, can also serve to make it incredibly challenging to reduce consumption of these foods in the interest of sustainable and healthy diets (Princen 2010). In addition to the cultural power of these products, the many power dynamics that lead certain actors to play a critical role in controlling prices influences the ability of others to reduce consumption of certain commodities. When governments do try to decrease the consumption of products through price mechanisms, they often face considerable pushback, and the exercising of instrumental power by those who stand to be most affected (Mason 2016; Waters 2017).

At the same time, exercising structural and instrumental power, private funding for research on sustainability, nutrition and health has perpetuated vested interests and provided evidence in the contested discursive debates about the way forward, shown in the ideational debates feature of this framework and explored more in Chapter 4 (Brownell and Warner 2009; Lipton 2015). Through these narratives, corporate actors in the food sector are given leverage to point to the many efforts they are making, while ignoring the overall impact of their products from a health or sustainability perspective. The power of corporations does not exist in a vacuum as demonstrated by the differentiation between power and influence. Rather, power rests on attaining and maintaining legitimacy, making the legitimacy claims of corporate actors critical context for this work.

Conclusion

While obvious overlap exists between legitimacy struggles and the four features of the framework, teasing out the ways that these characteristics impact the political economy of the food system provides a useful exercise to examine the current state of play on sustainability initiatives by Big Food. Further, applying this framework to the potential impact for sustainable diets highlights the importance of a legitimacy lens for this work, as these four characteristics influence the ability of actors to make legitimacy claims about their role, their ideas, and the best way forward. Each aspect of the agrifood governance landscape, while connected to the others, provides unique insights that, along with a legitimacy lens, to help explain how, why and by whom certain aspects of sustainability, and ways of achieving them are prioritized. In doing so, the framework helps illuminate the obstacles to sustainable diets as a holistic food system approach to sustainability and the political and economic dynamics that play a role in creating and preserving those obstacles.

Each subsequent chapter examines a set of sustainability activities that were identified as widespread across Big Food companies. These activities are being tied to the legitimacy of these companies, and their prospects for future growth. Each sustainability activity was analyzed using the framework above as a heuristic to think through these complex issues, drawing out those aspects that were most helpful in understanding the prevalence and politics of that theme. The framework helps us to understand how these features of governance shape how the sustainability strategies, and dietary sustainability are articulated and linked to legitimacy, applied in the following chapters.

Chapter 4 The Science of 'Sustainable' Junk Food: Big Food and Discourses of Sustainability Science

Introduction

The "value-free ideal" is seen by many observers as the goal for conducting good science, but is it possible to disconnect values from science (Douglas 2009)? Can science provide objective ways of understanding a path forward for sustainable food systems and diets? Big Food's foray into the science of sustainability attempts to do just this, but the scientific understandings that are shaped by the activities of these corporations have real implications for the future of sustainable food systems and warrant further attention. This chapter is the first of three that focus on revealing Big Food's sustainability strategies that have important considerations for sustainable diets and future food sustainability. This chapter is based on the document analysis conducted for the thesis, focusing on how sustainability is measured and conceptualized in scientific terms within Big Food companies, and the networks that support them. Big Food companies are engaged with environmental issues and are implementing a variety of methods to improve their performance but it is the measurement of sustainability using 'scientized' methods that is the backbone of all other efforts. Here, the terms 'scientized' or 'scientization' are meant to elicit an attempt to make debates about the nature of sustainability strategies an apolitical discussion amongst scientists (Kinchy 2012). Strategies on sustainability metrics and science have been heavily influenced by accepted methods in this industry. At the same time, corporate actors are active players in funding research on food system sustainability and in disseminating scientific knowledge and innovations with respect to sustainable agriculture.

This chapter demonstrates that Big Food's sustainability activities around science and sustainability metrics are articulated in a way that narrows sustainability down to specific data points. This trend has implications for defining what sustainability means in the food system and what sustainable agriculture means, more specifically. These definitions work to exclude some aspects of sustainable agriculture that are accepted elsewhere, but also shape the conversation specifically around certain metrics while obscuring other important factors in the complexity of food system sustainability more broadly, including health, rural livelihoods, or aesthetics.

Importantly, these ideational debates occur in the context of powerful corporate norms of growth and efficiency, which influence the objectivity of science in this context.

Uneven power dynamics in the food system contribute to a situation where corporate actors have the ability to shape scientific priorities, and minimize risks by potentially contributing to perceived objectivity, and legitimacy. Science has also led to a focus on life cycle assessment, which in turn allows corporations to frame other actors as the site of governance. Farmers and consumers have become important sites of action where corporate actors can download risk and responsibility for creating more sustainable food system decisions. This in turn gives corporations more control over suppliers, and a better understanding of the risks in their own supply chains. Power plays a critical role in helping companies minimize risks and reinforce ultra-processed foods through their funding of science, and shaping of narratives that occur in public policy and debate.

The chapter will unfold as follows. The first section will address the role of scientific expertise, power and discourse in shaping legitimacy in debates and approaches to sustainable diets. The second section will provide the empirical foundation with an overview of the various activities that Big Food corporations are undertaking on issues of measuring progress and priorities, research and development, and knowledge transfer. The final section will use the conceptual framework to analyze and outline how the sustainability strategies described in section two, along with features of the current global food landscape, allow corporate actors to: 1) shape ideational debates around sustainability, narrowing the focus despite complex supply chains; and 2) shape scientific priorities and download risk and responsibility onto other actors in the food system, while framing this approach as legitimate. This section will also discuss the policy implications of these findings.

4.1 Sustainable Diets and the Role of Science in Society

This section examines broader debates about the role of science in society, its values, objectivity, and legitimacy. It provides additional context for understanding how legitimacy interacts with features of the analytical framework and is particularly important to consider how certain norms and values are potentially framed as legitimate, while assumptions are made about the absence of

other values in science. This section draws on literature that helps to better understand how ideas within and about science gain legitimacy, as well as how institutions and actors can use science to frame their work as legitimate. Science is inherently value-laden, and the way that these values impact scientific research and outcomes, often comes down to not only who has power, but what ideas have legitimacy. The use of a scientific approach to sustainable diets begs for the consideration of values in science. Despite the "value-free ideal" of science becoming etched in the minds of the general population, a variety of authors have demonstrated how this is not only not the case, but is clearly not possible, or desirable for science in general (Douglas 2009; Krimsky 2015; Longino 1996). Douglas (2009) argues for distinguishing not between the 'types' of values (i.e. epistemic, social, ethical) but rather the 'roles' of values in science. She argues that there is both a direct and indirect role for values, but only in certain stages of the scientific process and with strict constraint or exclusion at other steps. For example, she argues that there is a direct role for values in the early stages of a project, to understand which projects to pursue, and how to go about those studies ethically but that the use of values should not limit the way that the study is formulated, and the methodology chosen, in such a way as to pre-determine the outcome (Douglas 2009). Funding also represents an area where values play a direct role in determining the projects chosen (Douglas 2009). For example, a funding institution may consider the value between two projects based on their subject of study, where one is seen to have little impact, while another studies a promising breakthrough that may provide progress on an issue that is of great concern to society. At the same time, we know for example, that considerably more funding goes to developing drugs related to lifestyle diseases than to tropical diseases, reflecting a value on profit for pharmaceutical companies that is accepted by society (Reed and McKerrow 2018). The indirect role for values in science occurs when there is incomplete evidence or uncertainty (Douglas 2009). In this case, there should be no direct role for values in determining what the evidence is saying, but rather an indirect role in deciding which claims are legitimate to make (Douglas 2009).

Understanding that values are inherent in science, it is important to consider how these values may play out, intentionally or unintentionally. Literature that explores the power of science in conjunction with the power of certain actors to frame that science highlights the significance and power of systems and institutions (Litfin 1994, 23). In a time where it might seem like there is a

war on truth and science, it is critical to understand the role that science plays in decision-making, not just by governments, but by other actors as well (Alterman 2018; Fairley 2016). Writing in 2004, Haas asked, "Why does power listen to truth?" (Haas 2004, 569), a question that attempts to understand the systemic authority of science. While political actors may not be taking environmental issues seriously, delaying action on climate change, corporate actors that depend on commodities that are in danger due to climate change are more inclined to pay attention. In a similar manner, Litfin argues that what she terms 'trans-scientific discourse' derives influence from authority of its agents, political context in which it is situated and the strength of its contents (Litfin 1994, 30). The political context may not create the necessity for change in rules, but some corporate actors have seen the lack of action as necessitating change on their part, evidenced by broader business participation and commitment seen at COP21 in Paris, and the subsequent growth of the Science-Based Targets Initiative (SBTi), discussed later in this chapter. The important point is that science has legitimacy in the context of global governance, and while some actors are currently ignoring the science of environmental change, other actors are taking it seriously, even if efforts are slow. Science can also act as a powerful lever in disputed narratives around the nature of sustainability in the food system.

Susanne Freidberg demonstrates the power of systems and actors working in concert through the example of Life Cycle Assessment (LCA) – a method of calculating the environmental costs of a product from production, to consumption, and disposal. Freidberg argues that LCA constitutes a system of technopolitics, defined as "the use of technology and technical expertise to pursue political goals" (Freidberg 2014). She argues for understanding LCA as a technopolitical project because companies use it to legitimate certain forms of supply chain governance despite its history of inconclusive results, inability to capture the complexities of food's ecologies, and accusations of 'greenwash' (Freidberg 2014). Thus, the use of scientific expertise and measurement of food impact are not without values, but are attempts to leave out the cultural context that comes with dietary choice and policy to pursue sustainable diets. Beyond this critique, LCA does not account for the economic impacts of different policies, or the outcomes of numerous actors vying for certain visions of sustainability. By seeing LCA as technopolitics, the effort to remove those politics becomes clearer.

In the context of sustainable diets and Big Food firms, the science put forth is not necessarily powerful in its own right, but the systems and values that surround science add to its power in the way that they favour technological solutions, perpetuate growth, and work within a market-based society. There is also an inherent business risk in not taking seriously the scientific consensus around climate change, and the environmental impacts of food production. Companies that choose to ignore the known consequences of their activities will only contribute to making it harder to source ingredients, and may face supply disruptions for their ingredients. Sustainable diets will require drastic changes to our cultural conceptions around food, and some of these may not be consistent with the continuous growth of companies that provide products unnecessary to diets. This chapter attempts to illuminate a better estimation of whose ideas are being maintained, and what voices are left out, by the way that companies define sustainability.

4.2 Science and the 'Science of Data'

Big Food firms engage with sustainability science in a variety of ways, with some companies doing and talking about 'science' far more than others. This chapter uses a broad understanding of science, as reflected in a quote from General Mills CEO, Jeff Harmening, when he states, "To tap new growth, General Mills needs to match the science of data with the art of marketing" (@emma_liem 2018; Nunes 2018). 'Science' in this context is not just about innovations occurring in laboratories but a 'scientized' way of managing information about the sustainability of company activities. This section provides a brief overview of some of the sustainability activities that fall under the umbrella of measurement and scientific priorities organized into three areas. First, across the board, Big Food firms are using a wide variety of metrics and tools to measure their environmental impact and progress against their sustainability goals. Second, they are playing an important role in research and development, funding science on food and agricultural sustainability. Third, communication efforts are important in engaging suppliers and consumers with knowledge transfer becoming a key part, and challenge of the sustainability story. These three areas emerged in the first and second cycle of coding as significant to Big Food companies. Additionally, science used by these companies to measure sustainability plays a critical role for shaping discourses of sustainable diets. For these reasons, these three areas became the empirical focus for this chapter.

4.2.1 Measuring Progress and Priorities

An adage in the world of corporate sustainability tied originally to Peter Drucker is, "What gets measured gets managed" (Prusak 2010). Others have pointed out the issues with this phrase regarding matters that are not easily measured or measuring the 'wrong' things (Hennessy 2015; Prusak 2010). Some have noted that the full proposition goes on to include, "even when it's pointless to measure and manage it, and even if it harms the purpose of the organization to do so" (Caulkin 2008). Firms working on corporate social responsibility (CSR) strategies for many years, have matured in their sustainability thinking from telling stories about sustainability to now wanting to demonstrate their progress with evidence (Sarni 2017). Sustainability metrics and data justifying their initiatives are now an essential part of the development and achievement of their strategies. These metrics represent a type of *calculative practice*, which Miller (2001) argues is a "technology of governing". Calculative practices modify the possibilities of behaviour, and can inform economic and social relations (Miller 2001). Similarly, Larner and Le Heron (2005) note the constitutive political power of calculative practices, particularly benchmarking. This ability to shape and be shaped by norms and behaviour can give those using these tools of corporate sustainability power to legitimize their actions. Similarly, Vallentin and Murillo (2012) show that the business case, as a calculative practice, is often seen by some as the most effective way to create momentum around CSR initiatives. Thus, the ability to measure improvement, and connect it to other calculative practices can become a powerful way for those inside companies to legitimize the work that they are doing as well.

The following section outlines some of the most prevalent tools of sustainability measurement in this sector: materiality assessments, life cycle assessment, on-farm assessment tools, and finally, science-based targets. Together these strategies for assessing sustainability play an essential role in the approaches to sustainability developed by these firms.

Materiality Assessments

Materiality assessments are meant to capture the potential impacts of the business on the economy, environment, and society, and the importance of those impacts to stakeholders. In other words, it is meant to capture "the material information needs of the primary stakeholders for the report being issued" (Corporate Reporting Dialogue 2016, 3). Assessments of materiality

are one factor that influences the overall sustainability approach that a company takes, with the key issues under the three traditional pillars of sustainability[9] determined. These assessments in the context of food and beverage manufacturers include a wide-ranging variety of indicators, including, for example, human rights, water stewardship, women's empowerment, packaging and climate change. Interestingly, the materiality assessment is often misinterpreted by companies, according to corporate sustainability consultant and reporter, Elaine Cohen (Cohen 2017, 2014). Starting in 2018, the GRI's new effective standard 101 defines materiality as, "the principle that determines which relevant topics are sufficiently important that it is essential to report on them" (Global Reporting Initiative 2016). This entails reflecting the corporation's significant economic, environmental and social impacts, or those that substantively influence the assessments and decisions of stakeholders (Global Reporting Initiative 2016). Issue areas are then plotted onto a matrix with the impact along the x-axis and the increasing level of importance or concern along the y-axis. The materiality matrix provides a visual representation of how important a company perceives different issues to be to its business and its stakeholders. Materiality assessments are a critical starting point that provide one way of choosing the issues that should be given the most prominence in the rest of a CSR report.

Most companies use a materiality process of some sort, but there is significant variation in process, outcomes and reporting (WBCSD 2018c). In many reports, relatively little is offered on the exact details or procedures. For most companies, external consultants are hired to determine the material issues that should be put forward, discussion occurs internally on the impact and importance of these material issues, and then consultations with external stakeholders are held before a final report to the company (see for example, Unilever 2018). A few companies provide detailed explanations of this process, Danone, for example includes a methodology that includes a three-step process: identification, assessment, prioritization (Danone 2017). The identification phase uses an internal consultation process to create an exhaustive list that is then reduced through research and assessed using a quantitative survey involving 130 Danone employees, 200 professional stakeholders, and 17 key customers. Finally, based on the feedback, the company defines the key topics to address its priorities ranked based on their potential impact, and importance for stakeholders. Danone also offers additional information on how to understand the

[9] Economic, social and environmental.

materiality, how it is "tiered" to include more topics, and the interrelated nature of topics (Danone 2017). The end result is often a product of who the company deems to be important in the stakeholder process and the time frames they use, but the exact stakeholders are rarely described beyond vague categories which some argue is problematic and requires new disclosures (Eccles and Youmans 2016).

Table 4.1 shows the relative importance of material issues to the top ten Big Food companies based on their occurrence in materiality matrices from 2015-2018. Associated British Foods was excluded from this analysis as it does not report to the GRI or use a materiality methodology. Further explanation and a detailed comparison is available in Appendix D. The results of this analysis show that certain issues have become part of the norm in determining materiality, with GHG emissions and supply chain responsibility being the most prevalent issues across all reports. Examining the materiality of companies can also provide telling insights, with companies like Unilever including 'sustainable consumption', 'tax fairness', and 'the marine environment' as part of its materiality matrix, while no other companies included these as part of their materiality considerations (Unilever 2018a). Danone is another company that has a variety of issues listed that did not make it into other company lists, for example 'responsible use of industrial automation' or 'partnerships for achieving the Sustainable Development Goals' (Danone 2018a). Mars has some diverse material considerations, including 'responsible pet ownership', given its large pet care business, as well as 'managing allergens' (Mars, Incorporated 2016). At the same time, the company does not list transparency as a material issue, most likely because it is a privately-owned business without the same requirement for transparency. However, in a recent interview with Business Insider, Mars chairman, Stephen Badger said that the company has become more open in discussing its company and sustainability plan in the last few years, because that is what customers want (Thompson 2018). He noted,

> For most of our history, in fact ... for 99% of our history, we've chosen not to be in the public eye and we've really wanted our brands to engage consumers. And yet times have changed… consumers do want to know more about not only the brands that they're buying, but the company that is behind them…There are a range of issues that are very serious facing the world and that are a direct threat to our business if not addressed. Whether that's issues like climate change or labor issues in our supply chain or diversity and inclusion or health and well-being, these are really key issues that are significant challenges as well as opportunities to our business. We feel a

> responsibility to do our part in addressing them, and part and parcel of being able to do that is to speak publicly about our stance on these issues and hopefully enroll others to work with us in a coalition to address them (Thompson, 2018).

Mars is a unique case in that it is privately owned, but in many ways has aligned itself with other "sustainability leaders" in the sector, having a fairly comprehensive materiality matrix and participating widely in initiatives. In being a private company, it has more flexibility to take risks on sustainability that might not pay out, as it does not have the same shareholder responsibility.

Table 4.1: Material Issues by Occurrence in Materiality Matrices of 10 Big Food Companies (2015-2018)[10]

Material Issue	Total
GHG emissions	10
Supply chain responsibility	10
Energy management	10
Waste	10
Health and safety (related to employees)	10
Water management	10
Product safety/quality	10
Over-and under nutrition	10
Responsible Marketing	8
Food and nutrition security	8
Human rights	8
Product packaging	7
Labour protection	7
Business ethics, compliance and values	7
Animal welfare	6
Rural development and/or poverty alleviation	5
Transparency	5
Women's empowerment	4
Community engagement	4
Innovation and Technology	4
Product labeling	3
Biodiversity and land use change	3
Customer protection	3
Peaceful and inclusive societies	3
Emerging Markets	3
Data security	2
Air pollutants	2
Responsible automation	2 (1 potential)
Taxes	1
Sustainable Consumption	1
Marine Environment	1
Digital Economy	1
Investing in social innovation solutions	1
Partnerships for SDGs	1
Artificial ingredients	1

[10] See Appendix D for more detailed explanation of these counts and source materials. Associated British Foods not included as they do not report on materiality in this way.

Managing allergens	1
Brands incorporating sustainability criteria	1
Compensation	1
Soil pollutants	0

Sources: (Danone 2018a; General Mills 2017, 6; Kellogg Company 2017a, 7; Kraft Heinz 2017, 17; Mars, Incorporated 2016; Mondelēz 2017a, 43; Nestlé 2016b, 17; PepsiCo 2017, 13; The Coca-Cola Company 2016b; Unilever 2018a)

There are varying ways that the materiality process, and its outcomes, are presented to stakeholders in CSR reports. Some companies, including Nestlé and General Mills, have extensive materiality lists which they use to structure their reports (see General Mills, 2017; Nestlé, 2016). In contrast, the Coca-Cola Company's latest report contains no materiality information within the actual report, and Mondelēz has only four materiality issues identified as significant (Mondelēz 2017a; The Coca-Cola Company 2016a). This variation is not necessarily a bad thing. There is debate over the usefulness of a large variety of indicators versus a small amount to focus on, and materiality is still an evolving field with a vast literature on the best ways to determine issue areas (Cohen 2018; Calabrese et al. 2017; Whitehead 2017). Regardless of the materiality method chosen, the presence of materiality alone shows that companies are using this tool as one way to strategically figure out where to focus their sustainability efforts. These determinations thus play a critical role in regulating what is part of making a company sustainable and what matters. In conjunction with the more 'scientific' methods listed below, these activities paint a more powerful picture to help legitimize Big Food efforts.

Life Cycle Assessment

Life cycle assessment (LCA) is a tool used by firms to measure the impact of their products. LCA helps companies understand the potential environmental impacts of a product from "cradle-to-grave", or in other words, from the very first inputs, until consumption and waste (International Organization for Standardization 2006). This approach grew rapidly during the early 2000s with an exponential growth in studies conducted to measure the impact of different food-stuff life cycles. In 2009, the Sustainability Consortium (TSC) was founded in partnership with Walmart. TSC was quick to distance itself from Walmart, with the greater goal of developing "the scientific platform that companies can use to assess the environmental impacts of consumer products over their lifecycle" (GreenBiz Editors 2009). The TSC was a driving force in pushing companies to use science to identify "hot spots" where environmental damage

was greatest. In the early 2010s, LCA was discussed quite heavily in the CSR reports of major food companies with reports from this time citing LCA frequently. Nestlé's 2013 report notes how LCA helps the company go above and beyond what is expected of it to improve products.

> The effort we put into LCA goes far beyond what we are required to do by environmental legislation. We use LCA to help us understand the environmental performance of our products and alternatives along their life cycle and inform decision making; to take actions to continuously improve our environmental performance; to respond to stakeholders' growing interest in the environmental performance of food and beverage products; and to provide credible substantiation for product environmental claims. (Nestlé 2013 pg. 221)

In recent years, companies use less detail in discussing their Life Cycle Assessment efforts within their CSR reports and are engaged in less actual LCA studies themselves. However, they are using other LCA studies in the background to justify their focus areas, while relying less on it in their public documentation. This shift is perhaps because LCA has become so common it is no longer something that proves a company is going above and beyond. Nestlé's 2016 Creating Shared Value report discusses LCA only a handful of times, whereas the 2013 report covers it extensively on 32 separate pages. General Mills uses LCA to organize the greenhouse gas portion of its report, going through each phase of production to show what percentage it contributes to emissions, and what it is doing to reduce them (General Mills 2017).

Life cycle assessment has been the subject of much research, from a vast number of studies using the method to understand the impacts of individual foods, to those working to improve the methodology behind the practice. Susanne Freidberg has done extensive work to understand the implications of the use of LCA in corporate food supply chains from a social science perspective. She highlights the tensions inherent in the field – on the objectivity of the practice, value judgments characteristic in its use, and the complicated relationships of LCA practitioners in a field where corporations are both their clients and sources of information (Freidberg 2014). In order to work with and for their clients, companies are forced to employ a variety of methods and tools, a few of which will be outlined below.

On the Farm Evaluation

Life cycle assessment was critical in identifying agriculture as a "hot spot" for corporations in the food industry. As such, they have made sustainable sourcing one of the biggest areas of focus

for their sustainability efforts, looking to their supply chains to make environmental and social improvements (Scott 2018). The Response-Inducing Sustainability Evaluation (RISE) Tool was created in 2001 with funding from Nestlé and uses the principles of LCA in identifying parameters for evaluation (Häni et al. 2003; Nestlé 2018a). A group of researchers at the Bern University of Applied Sciences School of Agricultural, Forest and Food Sciences (HAFL) developed the tool to assess sustainability at the farm level using a system orientation. The tool has a number of indicators that change based on the specifics of the project, and have been revised over time from twelve original indicators down to nine in its current version[11] (3.0) (HAFL at Bern University of Applied Sciences 2017). Data are collected through a three-hour interview with farmers, and then analyzed using the RISE software program. The indicators are used to create a visual polygon that shows the degree of sustainability for that farm ranging from problematic, critical, to positive. Since its development, the RISE tool has been used on over 3,300 farms in 57 countries and has been used by the FAO in the development of its Guidelines on Sustainability Assessment of Food and Agricultural Systems (HAFL at Bern University of Applied Sciences 2017).

Nestlé was one of the first companies to use the RISE tool to assess farmers in its value chain. In 2016, the tool was used in 55 studies in 6 markets (Nestlé, 2018). The tool has also been adopted by Danone as of 2013 (Danone 2013). The RISE tool represents one instance where companies are taking their assessment to the fields, to assess suppliers, improve their performance and establish sustainable sourcing options for their supply chains. Similarly, PepsiCo established and implemented in 2013, the Sustainable Farming Initiative (SFI), which it used to assess roughly 500 growers across 18 countries in 2016 alone (PepsiCo 2017, 63). Likewise, through the Field to Market initiative (discussed more below), the Fieldprint Platform was developed to measure the environmental impacts of commodity crops and identify areas where improvements can be made (Field to Market 2018a). This platform gives an assessment not dissimilar to the RISE tool, with a polygon visual, also called a spidergram, provided on a series of environmental metrics. This polygon also shows the state and national average for users to compare. The tools used by these companies to assess supplier sustainability can play a powerful role in determining which

[11] The indicators are soil use, animal husbandry, materials use & environmental protection, water use, energy & climate, biodiversity, working conditions, quality of life, farm management

farms are considered sustainable to meet company sustainable sourcing goals. Thus, the tools used are celebrated in sustainability reports as helping farmers become more sustainable with quotes, such as,

> "What the Sustainable Farming Initiative does for us, as farmers, is make us look inside our operation to make sure we're using water correctly, make sure we're treating our people properly, make sure we're protecting the land. It has allowed us to really take a good hard look at ourselves in the mirror and find ways we can improve." - Leah Brakke, fourth-generation potato farmer (PepsiCo 2017, 63)

While these tools may help some farmers make improvements, they also reinforce the power of sustainable agriculture visions put forward by these initiatives and the priorities emerging from these metrics. The companies who can assess and differentiate between suppliers more easily are given the ability to better control their supply chain. The capacity to control supply chains, and particularly the emissions coming from them, has become imperative to meeting new climate goals that are absolute, pushed by the industry trend of science-based targets.

Science-based Targets for Climate Change

Science-based targets for climate change are relatively new, but growing quickly in credibility and uptake among Big Food firms. Science-based targets (SBTs) are a new approach to climate targets that ask companies to align their GHG reduction targets with the level of decarbonization essential to keep global temperature increases below 2 degrees Celsius, as set out in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Science-based Targets, 2018). This approach comes from the Science-Based Targets initiative (SBTi), a collaboration of the World Resources Institute (WRI), Carbon Disclosure Project (CDP), World Wildlife Fund (WWF), and the United Nations Global Compact (UNGC). The goal of this initiative is to make this type of target setting standard practice for businesses, noting that corporations will be required to play a central role in driving down GHG emissions. The initiative went from having 114 companies as of the Conference of the Parties in Paris in 2015 to having over 500 companies committed to the initiative (Science Based Targets Initiative 2018a).

There are a few ways that companies can create a target that is considered science-based. First, they can create a target using the 'sector-based approach' that "divides the carbon budget by sector and then allocates it to companies in that sector" (Science Based Targets Initiative 2018b).

Second, they can use the 'absolute-based approach' that "assigns companies the same percentage of absolute emission reductions as is required globally – ie. 49% by 2050 from 2010 levels". The final method for determining a target is an 'economic-based approach' that is based on the global GDP and gives companies a target that is determined by its gross profit (Science Based Targets Initiative, 2018b). Meeting these targets depend heavily on technical expertise to enable companies to measure their carbon emissions, demonstrate that they are moving towards their science-based target, and how they are doing so.

In 2016, near the end of the Oxfam Behind the Brands campaign, the organization encouraged companies in the food and beverage manufacturing sector to adopt SBTs to create a GHG emissions reduction target, praising General Mills and Kellogg for doing so (Oxfam 2016). Many of the major companies in the industry did as well, with all but two of the top eleven taking this route (see SBTi). Science-based targets are meant to be ambitious, encouraging companies to take on the challenge of Scope 3 emissions – those emissions that are indirect but occur in the company's value chain up and downstream. These are differentiated from Scope 1 direct emissions, and Scope 2 emissions from the generation of purchased energy (Greenhouse Gas Protocol 2011). Not all companies are currently including Scope 3 emissions, and there remain challenges in figuring out exactly how these will be assessed (Gowdy and Winston 2016). These challenges will likely be taken up by further research and development both within these companies and by the multi-stakeholder initiatives and academics with whom they work.

Table 4.2 Participating Company Targets in the Science-Based Targets Initiative

Company	Status	Date Committed	Commitment
Danone	Targets Set	Nov 2017	Danone commits to reduce scope 1 and 2 GHG emissions 30 percent by 2030, from a 2015 base year. Danone also commits to reduce scope 1, 2 and 3 emissions per ton of sold product 50% by 2030, from a 2015 base year. Danone will adjust its science-based targets a full calendar year after the recently-acquired White Wave company has been fully integrated into Danone's inventory boundaries.
General Mills Inc.	Targets Set	Sep 2015	General Mills commits to reduce absolute emissions 28% across their entire value chain (scopes 1, 2 and 3), from farm to fork to landfill by 2025, using a 2010 base-year. The Scope 3 reductions cover total GHG emissions across all relevant categories with a focus on purchased goods and services (dairy, row crops, and packaging) and delivery and distribution.

Kellogg Company	Targets Set	Dec 2015	Kellogg Company commits to a 15% reduction in emissions intensity (tonne of CO2e per tonne of food produced) by 2020 from a 2015 base-year (scopes 1 & 2). Kellogg commits to reduce absolute value chain emissions by 20% from 2015-2030 (scope 3). Kellogg also has a long-term target of a 65% absolute reduction in emissions by 2050 from a 2015 base-year (scopes 1 & 2) and to reduce absolute value chain emissions by 50% from 2015-2050 (scope 3).
Mars	Targets Set	Sep 2017	Mars commits to reduce absolute Scope 1, 2 and 3 GHG emissions 27% by 2025 and 67% by 2050 from a 2015 base-year. Within that goal the company commits to reduce scope 1&2 emissions 40% by 2025 and 100% by 2040.
Nestlé	Targets Set	Feb 2017	Nestlé commits to reduce absolute Scope 1 and 2 GHG emissions by 12% between 2014 and 2020, ensuring a reduction in emissions per tonne of product of at least 35% between 2010 and 2020. Nestlé will also work to reduce Scope 3 GHG emissions by 8% between 2014 and 2020.
PepsiCo, Inc.	Targets Set	Nov 2016	PepsiCo commits to working to reduce absolute greenhouse gas emissions across our value chain (scopes 1, 2, and 3) by at least 20% by 2030 from a 2015 base year.
The Kraft Heinz Company	Committed	Jul 2018	Target not yet approved.
Unilever plc	Targets Set	Jun 2017	Unilever commits to reduce scope 1 and 2 GHG emissions 100% by 2030 from a 2015 base year. The company also commits to reduce GHG emissions from the life-cycle of their products 50% per consumer use by 2030 from a 2010 base-year.
Coca-Cola HBC AG	Targets Set	Jan 2016	Coca-Cola anchor bottler Coca-Cola Hellenic Bottling Company AG's target commits to reduce Scope 1 and 2 emissions 50% per liter of produced beverage from 2010 – 2020 and reduce total value chain emissions (Scope 1, 2, and 3) 25% per liter of produced beverage over the same period. CCHBC has also committed to developing additional supporting Scope 3 (cold drink equipment and packaging) targets in 2016.
Coca Cola European Partners	Targets Set	Dec 2017	Coca Cola European Partners commits to reduce absolute GHG emissions from business operations 50% by 2025, from a 2010 base year. The company also commits to reduce GHG emissions per 'drink in your hand*' 35% by 2025, from a 2010 base-year. * GHG emissions of the 'drink in your hand' refers to the GHG emissions across CCEP's value chain (scope 1, 2 & 3) associated with a litre of sold product.

Source: (Science Based Targets Initiative 2018a)

4.2.2 Research and Development

Big Food companies are bringing "science" into operations in broader ways, through research and development. The leading companies in the sector have sizeable research budgets that can compete with many public funding mechanisms. Nestlé has the "largest research network of any food company in the world," boasting that in 2016 alone it invested 1.7 billion CHF (close to 1.8 billion USD) on research and development overall (Nestlé n.d., n.d.). Of this 13.9 million CHF was spent on plant science soil management efforts (Nestlé 2016, 3). Unilever invests around 1 billion euro each year in research and development (Unilever Ventures 2018). Similarly, Mars indicates the importance of its efforts, stating that science is, "a key ingredient" in all that it does (Mars n.d.). Mars also highlights its scientific efforts on plant genetics specifically, noting its plant science work to map the cocoa genome, and current efforts to map the genome of "100 African orphan crops" (Mars, Incorporated 2012). Mars claims that these efforts help to increase food security, reduce malnutrition, and help farmers increase their incomes by growing more food (Mars, Incorporated 2012). Mars, the maker of Uncle Ben's rice, is also working at improving yields and sustainability in rice production (Mars, Incorporated 2012).

Likewise, General Mills has extensive efforts in sustainability science. The company works on a variety of issues, including funding an Oats Research Center at South Dakota State University to advance the "sustainability and quality of oats" (General Mills 2017). General Mills has also invested in dairy research that is aimed at being able to sustainably source its milk ingredients. In this program, the firm has moved to require farmers supplying milk to use a Farm Smart 2.0 tool, from the U.S. Dairy Innovation Center, with funding from General Mills. General Mills has also been actively funding research on pollinators. Since 2011, the company has invested over 6 million USD on efforts to improve pollinator habitats, research bee cells, and to open dialogue with the public through its missing bee campaign on Honey Nut Cheerios boxes, and associated wildflower seed campaign (General Mills 2017). General Mills has also done significant work to support soil health in the U.S. specifically, partnering with the Nature Conservancy to produce a Road Map to Soil Health (General Mills, 2017).

Unilever discusses its input on developing the science of LCA, highlighting the company's contribution to the research in this field. The company outlines how it uses life cycle assessment

to design new products, assess existing products, and to engage with partners on science and methodological development (Unilever 2018b). The company describes the work on its website,

> We engage with partners to develop and promote the science used for LCA, aiming to improve both the robustness and scope of life cycle-based approaches and assessment. We have published a number of papers (2017 publications list below) on new impact assessment methods for LCA within the areas of land use, biodiversity and water-related impacts and the challenges of applying a planetary boundary-based approach (Unilever 2018b).

Other companies are also spending money on scientific research related to nutrition and sustainable food systems. However, beyond the examples presented, many do not highlight their spending or capacity in the way that Nestlé, Unilever, and Mars do. Mondelēz has worked specifically to improve wheat sustainability through its Harmony Wheat Program, as wheat makes up a significant portion of the company's ingredient needs as major cracker and cookie makers (Mondelēz 2017a). Many companies, even those that do extensive science, do not provide many details on the specifics of the work they are doing or connect easily to the researchers that are receiving funds from them. However, some of them do use this information in highlighting their efforts to transfer knowledge to farmers and consumers.

4.2.3 Knowledge Transfer

While developing extensive scientific research and metrics, Big Food companies are in the middle of a supply chain that requires them to work with a variety of other actors. Some of these actors, like retailers, are putting the impetus on these firms for the sustainability information that they are required to provide. Similarly, consumers increasingly want more information about where their food comes from, how it is produced, what the impacts are, as well as health information about the products. These increasing demands for information, in addition to their need for data to answer these questions, has made them powerful knowledge brokers. Much of this knowledge entails the collection of "scientific" data and measurement, as well as the dissemination of scientific improvements that are advanced through the research and development conducted and funded by corporations.

Susanne Freidberg (2017) has highlighted the Field to Market initiative as an interesting case where Big Food companies are struggling to get the information they need to certify the products they create. Field to Market: The Alliance for Sustainable Agriculture consists of a wide variety

of agricultural supply chain actors. It includes agribusinesses, grower organizations, food and beverage companies, retailers, conservation groups, universities and public sector partners. The mission of the organization is stated, "to meet the agricultural challenge of the 21st century by providing collaborative leadership that is: transparent, grounded in science, focused on outcomes, open to the full range of technology choices, committed to creating opportunities across the agricultural supply chain for continuous improvements in productivity, environmental quality, and human well-being" (Field to Market 2018b).The Fieldprint tool focuses on continuous improvement rather than specific goals for each farmer. The tool has faced challenges due to the time-consuming nature of the program for farmers, in addition to the inability of companies to verify the sustainability of supply, given that data is anonymized (Freidberg 2017b).

While they are requiring information from farmers, Big Food companies are also playing an active role in knowledge dissemination. Nestlé employs roughly a thousand agronomists, specialists and extension workers globally that work with farmers to improve their yields using a variety of scientific methods and technological developments (Nestlé 2012). As part of the Nestlé Cocoa Plan, the company has delivered high-yielding plantlets and educational opportunities to small-scale farmers that supply them (Nestlé 2016c). Unilever also has a wide variety of programs to work with smallholder farmers. The company notes in its 2015 Annual Strategic Report that since 2006, it has worked with well over a million farmers to provide access to initiatives to improve their agricultural practices (Unilever 2015a).

General Mills, more North America-based than many of the other companies, has less of a global presence as of 2018. The company has an annual grower engagement cycle that focuses on farmers in the U.S. and Canada, working with Field to Market, and its Canadian offshoot, the Canadian Fieldprint Initiative. Noting that most of its impact occurs in agricultural supply chains, the company works to improve performance using an iterative process with farmers (General Mills 2017). The grower engagement cycle has four major engagement points: growing season and harvest, post-harvest, early spring, spring. During growing season, data collection is occurring on farm, and come post-harvest the data is analyzed and communicated with tailored reports that provide "actionable feedback" (General Mills, 2017, 44). In early spring, growers are

asked to attend workshops put on by agronomists hired by General Mills, while during the growing season they are "equipped with detailed guidance to improve sustainability performance" (General Mills, 2017). The work to measure farmer performance and communicate with them to ensure they improve illustrates that much of the environmental measurement going on makes farmers the site of action.

4.3 Understanding Scientization in the Global Agrifood Landscape and Sustainable Diets Debate

The activities of Big Food firms that have been detailed throughout this chapter thus far illustrate a particular way that sustainability has been conceptualized in the food and beverage manufacturing industry, and in the corporate sustainability world more broadly. The following two sections will consider how key political and economic features of the current global agrifood landscape outlined in the framework (Chapter 3) interact with the environment in which these sustainability strategies and measurements have been articulated. These sections will consider how the features of the current agrifood landscape that help us understand environmental politics of food and agriculture, may also be used to frame Big Food as important players in future food sustainability. Here, the analytical framework helps to unpack the ways that complex supply chains are scientized and measured, and how ideational debates about the future of food sustainability can determine the ways that sustainability is operationalized. Importantly, this work seeks to understand how the legitimacy of ideas and institutions are vital parts of what make corporate sustainability visions viable. Legitimacy is also an important concept for thinking through the ways that values like efficiency, growth, and business strategy interact with scientific debates about the measurement of sustainability. For example, literature on values in science as well as the concepts of thick and thin legitimacy illuminate how a corporate value such as growth can influence the way that sustainability is conceived, while being uncritically accepted by stakeholders in the field of corporate sustainability (Douglas 2009; de Wit and Iles 2016). The second part of this chapter uses the concept of power as it is outlined in the analytical framework to examine how science is shaped through funding of research, and how uneven power may perpetuate certain ideas about which actors in the food system are seen as most responsible for creating change. Understanding the different sources and structures of power that have previously been conceptualized (structural, instrumental, ideational), helps in

understanding how these forms of power might impact the way that sustainability strategies are framed.

The first section focuses on ideational debates and legitimacy. Defining and operationalizing sustainability through the use of metrics creates space frame as legitimate narrow and weaker forms of the concept that evolve from ideational debates about the nature of sustainable food, diets and agriculture. In focusing on certain metrics, and technopolitical projects, aspects of sustainability crucial for realizing the concept in a broader way are left out of the conversation. At the same time, while health is seen as important to overall sustainability efforts as presented in CSR reports, the focus on metrics creates a division between the two, which has consequences given the way that sustainability and health are often intricately linked at the consumer level, as explored in Chapter 6. The narrowed definition of sustainability also aligns with norms and corporate culture that do not threaten growth. In deciding what sustainability means in this context, corporate actors are engaged in ideational debates and can draw on the perceived objectivity of science as a tool to frame their work as legitimate. The second section focuses on uneven power dynamics and the results that may determine who is seen as legitimate, and who has responsibility for change. The sustainability measurement strategies outlined take advantage of uneven power dynamics in the global food governance system to minimize a variety of risks related to Big Food's business. Scientific funding can shape research and perceived legitimacy for certain norms on the best ways forward for food and agricultural sustainability. Simultaneously, 'scientized' and quantitative understandings of sustainability reinforce farmers and consumers as the sites of governance, downloading risk and responsibility onto these other actors. Finally, the last section will consider the policy implications of scientized sustainability for how sustainable diets policy and governance may proceed.

4.3.1 Operationalizing Sustainability through Science: Ideational Debates and Legitimacy in Complex Food Systems

The activities of Big Food firms on science and sustainability data can have a powerful impact in shaping what sustainability means in the food system, and how this vision is legitimized and validated. The use of metrics to measure importance and impact, including materiality, LCA, and more recently science-based targets, allows firms to point to the progress they are making, giving

them metrics to back up their legitimacy claims. Companies are taking full advantage, using every opportunity to tout their credentials and awards earned from the numerous multi-stakeholder initiatives and non-governmental organizations that they are working with. For example, in the latest CSR Report from the Kellogg Company, the company highlights Oxfam's praise for its science-based emissions targets on the same page it discusses what the company is doing to reduce greenhouse gas emissions and energy use (Kellogg Company 2017, 23).

Tools to measure impacts and the importance of those impacts to stakeholders are a powerful way for companies to justify the actions they are taking. Materiality assessments are particularly significant in this respect as they are used to identify the impact areas for the company, and to engage with stakeholders to understand what matters to them. These assessments then play a critical role in communicating why they have chosen what to focus on. However, there is often little description of the process of materiality, and how decisions are made on where to prioritize efforts. Materiality assessments appear to provide some level of objectivity in what is important but are certainly value-laden. Danone has taken health, wellness and the environment more seriously as part of its business, and has a far more extensive materiality assessments covering an astounding range of issues (see Appendix D). On the other hand, Mondelēz offers only four vague materiality issues that could encompass a wide range of issues but could also be narrowly defined (Mondelēz 2017a).

Ideational debates and norms more broadly also play a significant role in defining the issues that are seen as significant. The corporate culture of these companies has a meaningful impact on the relative importance of these issues, as it is internal stakeholders that are some of the first to decide on what issues get put forward (Danone 2018a; Nestlé 2016b). Kraft Heinz even notes that the first question used to filter potential issues is, "How does the issue align with our Vision, Values, and overarching business strategy?" (Kraft Heinz, 2017, 17). The importance and consideration of issues of materiality is also decided in the context of broader societal values and the matters most important to stakeholders in today's climate. Kraft Heinz lists GHGs as one of the top issues in terms of importance to its business and importance to stakeholders (Kraft Heinz, 2017). On the other hand, human rights, and responsible marketing are seen as significantly less important to the company and stakeholders. How is this decision made, and how do values play

into it? The lack of clarity around how values have played a role in shaping the materiality assessment makes it less useful in assessing whether or not all issues have been captured. At the same time, academic and multi-stakeholder initiative literature in this area has noted that there is often little clarity on the methods used, with many looking to use more quantitative measures to show how priorities were chosen (Calabrese et al. 2017, 2016; WBCSD 2018c).

Materiality assessments are part of the starting point for prioritizing issue areas. Undoubtedly, environmental issues are high on the minds of stakeholders, making LCA, on farm tools and science-based targets an important factor for quantifying and justifying the environmental actions of these firms. However, this has often meant a narrow understanding of sustainability. The sustainability strategies arrived at by using tools such as life cycle assessment, ignore many of the trade-offs inherent in food sustainability. At the same time, quantifying impacts in a "scientific" way can help frame the legitimacy of efficiency improvements throughout the value chain, continuous improvement rather than absolute reductions, and perhaps most importantly, fully embraces the growth of these firms.

The growth imperative is expected and obvious from these companies – Mondelēz's CSR strategy is even called, "Impact for Growth" (Mondelēz, 2017). However, the inherent value in continued expansion and growth highlights ideational debates about the functioning of the economy in a finite world (Heinberg 2011; Jackson 2011). While these sustainability measurements may reduce environmental harms to some extent, they do not jeopardize the ability of these companies to continue expanding, while providing little information on the capacity to decouple growth from resource use. Supporting this is the fact that, not all, but many of the metrics used by these firms include efficiency goals with reductions per ton of food produced or product sold. For example, Kraft Heinz has committed to reducing greenhouse gas emissions, energy, water, and waste-to-landfill by 15% by 2020 based on a 2015 baseline, per ton of product (Kraft Heinz, 2017, 32). Similarly, Kellogg has committed to 15% reduction of energy and GHG emissions, water, and total waste by 2020 from a 2015 baseline, per metric ton of food produced. If the amount of food produced and sold continues to increase in line with company growth goals, the amount of emissions could very well increase if efficiency goals are used. However, companies have faced increasing pressure, particularly on GHG emissions to

move away from efficiency goals – a positive result of the SBTi. Many companies have created absolute reduction goals for certain metrics, including General Mills which has moved to almost entirely absolute reduction goals (General Mills 2018a). Nestlé has committed to "reduce their GHG emissions per tonne of product in every product category to achieve an overall reduction of 35% in our manufacturing operations vs. 2010" (Nestlé, 2018a). Efficiency goals and continuous improvement allow companies to show that they are making change, but do not necessarily align with the effort needed to bring global resource use within planetary boundaries. At the same time, the increasing use of science-based targets provides companies tools in their claim to legitimacy, showing they are working towards something that is validated by an external body. Kellogg Company notes of its science-based target, "this is all part of our wider story as 'brands with purpose', and the actions we are taking as a result of having set a science-based target are essentially proof points of our commitment to sustainability and to leadership to protect the planet" (Science Based Targets Initiative 2016).

Beyond growth and efficiencies, the use of science in corporate sustainability provides an appearance of objectivity to the measurement of impacts in company supply chains in a world where expertise is often called into question (Freidberg 2014; Kunseler and Tuinstra 2017; Unilever 2018d). This appeal to objectivity is necessary for companies to justify their position and actions in ideational debates about the nature of sustainable food and agriculture. For example, the Sustainability Consortium notes,

> In our early days, the collaboration was driven by a profound but simple mantra: Let's use science to make consumer products more sustainable. We identified social and environmental hotspots using scientific publications, demonstrating that science can provide the objective guideposts for a shared understanding of what matters the most (The Sustainability Consortium 2017, 5)

Common understandings of science assume objectivity but have been debated heavily in literature on the philosophy of science. Lacey (1999) puts forth three parts of what it means for science to be value-free, asserting that science must remain autonomous (distinct from societal concerns), neutral (have no implications for human values), and impartial (evaluating evidence should use only cognitive reasoning, not social or ethical). A background in philosophy of science is not required to see that this ideal is unlikely to be achieved, while at the same time questions are raised on the merit in achieving it when doing science for policy-making. Douglas

(2009) argues that the value-free ideal of science assumes autonomy of science from society, stripping it of values that she argues are integral to science that is used in policy-making. Big Food firms use metrics to track their sustainability and justify their actions, but rarely are the values around these measurements explicit. This is an important omission, because these processes of quantification are certainly value-laden, while the value-free ideal in science is part of what makes it such a powerful force for companies seeking to assert their legitimacy.

Sustainable agriculture has become a focus of companies, resulting from life cycle understandings of where to prioritize action and leading to further tools like RISE and the Fieldprint Calculator. Companies often point to the fact that their agricultural supply chains represent some of the biggest impacts of their products (General Mills 2018a; Nestlé 2018b). The emphasis on sustainable agriculture has encouraged companies to invest a great deal of resources on this issue. The Sustainable Agriculture Initiative Platform – " a non-profit organization to facilitate sharing, at a precompetitive level, of knowledge and best practices to support the development and implementation of sustainable agriculture" – has been growing since 2002, started by Nestlé, Unilever and Danone and now including the Coca-Cola Company, Kellogg, and Mars (SAI Platform, 2018a, 2018b). Visions of sustainable agriculture put forth by these companies are diverse, but undoubtedly include the use of industrialized production and technologies. In addition to that, companies such as Kellogg, are advocating for climate smart agriculture, a term that is ill-defined and contentious in its application, often serving to promote small improvements to industrialized systems (Kellogg Company, 2017; Taylor, 2018).

Supply chain sustainability has ramifications for conceptualizing sustainable diets across many issue areas. Importantly, these companies perpetuate the 'more' sustainable production of crops that are intended for use in their products. They are helping farmers through their extension programs, plant distribution, and supplier engagement, but this work does not consider the broader goals of the food system, rural landscapes, and diets. Corporate actors put forward visions of their ideal sustainability and influence farmers on the ground. Interestingly, the RISE Tool originally included measurements of the local economy and social situation (Häni et al., 2003) but these have been replaced with economic viability, 'competitivity', and working conditions in later years (Danone, 2013), reflecting a change in values that appeared more

focused on the place of the farm in the broader rural economy, to more internal measures of farm success. This value shift is in line with the narrowing of sustainability demonstrated elsewhere.

Ideas about what is considered sustainable food and what is considered sustainable agriculture to produce this food are heavily influenced by the scientific measurements and processes that quantify impacts. While these tools are incredibly useful, the interpretation of this data holds values. This data can also be presented in ways that align with values and norms already established. When evaluating corporate sustainability strategies on sustainability to consider their implications for dietary sustainability, it is critical to consider the full range of values that might be integrated into the discourse around these ideational debates.

4.3.2 Uneven Power and Legitimacy: Shaping Science, Shifting Risk

With their large research and development budgets, Big Food companies are capable of shaping scientific priorities through the instrumental power they derive from financial and physical resources. Science funding has been under scrutiny for many years, particularly in public health where conflicts of interest have been a source of distrust and corporate influence has been documented (Nestle 2015; Simon 2015; Chartres, Fabbri, and Bero 2016). Researchers have pointed to Big Food, Big Soda, and the sugar industry as having undue influence on research priorities and outcomes (Brownell and Warner, 2009; Kearns et al., 2016; Moodie et al., 2013). Questions continue to emerge about the impacts of industry funding on science, with academics like Marion Nestle following these developments closely (Nestle, 2018) and recent media attention on the issue of funding to researchers in Indonesia (Fuller et al., 2017). Even the safety of genetically modified organisms (GMOs) has been called into question by some researchers, with unprecedented backlash against those with findings outside the accepted notion that they are safe for human consumption (Krimsky, 2015).

With dwindling science research budgets coming from governments, many scientists are forced to find funding elsewhere (Ioannidis, 2017; Malakoff and Cornwall, 2017; Petherick, 2017). Over half the funding for scientific research in the 2000s came from private sources (Douglas, 2009). This trend affects visions of sustainable food systems, and the science that is being conducted in the name of sustainable agriculture. Given this trend, Krimsky (2000) argues that

there is a need for what he calls, “honest science”. Honest science is “science that discloses financial interests and other social biases that may diminish the appearance of objectivity in the work” (Krimsky 2000, 187). However, this ‘honest science’ ideal may not be enough, because it does not provide an explanation of how values affected scientific reasoning (Douglas 2009, 21).

The growth of industry funding for research amidst decreasing public research funds has implications for what researchers can focus on as well. Companies can use their financial resources to influence what the application of research becomes in different issue areas. An example of this is cocoa, an extremely vulnerable plant grown in only a few areas of the globe, predominantly by smallholders. Cocoa has been the center of many efforts to improve yields and protect against disease and drought. The International Cocoa Collection contains nearly 1200 clones of cacao and has been an integral part of efforts to create hybrids with better disease resistance, yields, and flavour (Brenes, n.d.). The collection contains a noteworthy representation of genetic diversity in the species. However, much of the work is being funded by companies, including Mars, Nestlé and Mondelēz (Brenes, n.d.). Dr. Wilber Philips-More who curates the collection explains that funds provided are often earmarked for specific projects, leaving researchers struggling to maintain the collection for the sake of genetic diversity alone (Karp, 2017).

Big Food firms are major buyers of agricultural goods that farmers will continue to work to satisfy. General Mills, Nestlé, and Unilever in particular are spending vast amounts of money on funding science for sustainable agriculture, as shown previously. However, it must be noted that much of the work done by companies is about improved yields on food commodities to be sold to Big Food firms for ingredients. Companies consistently refer to improved yields as part of their projects with farmers. Nestlé and Mars have focused their plant science improvements on improving cocoa yields, while Kraft Heinz has highlighted its proprietary tomato breeds as improving yields for farmers (Kraft Heinz 2017). Nestlé lists five focus areas for its plant science research, with three of them being about improving the plant varieties for farmers, to improve productivity and crop quality (Nestlé 2018c).

The emphasis on sustainable agriculture has also led to governance that is farmer-focused. In their efforts to govern their suppliers and supply chains, companies have used the rubric of science and improvement to focus on farmers as the site of action. In the latest CSR reports from the top 11 companies, farmer productivity or yields were referred to 88 times, showing the emphasis on this aspect of working with farmers. This focused scientific research intended to provide sustainably-produced ingredients for companies has implications for food security, biodiversity and more.

In the latest reports, from 2016-2018, farming, farms, and farmers are mentioned 610 times across the 11 company reports[12]. Nestlé one of the leaders in sustainable agriculture and science is particularly focused on farmers with farm, farming, and farmers mentioned 3400 times in its reports between 2007 and 2017[13]. Interestingly, it appears that there has been a peak in this trend, with reports between 2014-2016 having farmers mentioned upwards of 400 to 500 times in each report, but then a reduction in the latest report to only 121 times (Nestlé 2018b)[14]. The decreased attention on farmers may come from a particular focus on the SDGs in Nestlé's latest report, which has forced a broader look at its impacts beyond its supply chain. Nevertheless, farmers still remain a key site for improvement, with one interviewee mentioning a move from collecting data about the current status of supply chains to a new focus on showing the impact of efforts over the years, potentially including monitoring of issues like soil health quality[15].

Knowledge transfer efforts of companies such as Nestlé and Unilever take the scientific research on improving crops and farming methods and use extension work to disseminate it to smallholders globally. Their stated goals often involve improving the livelihoods of these smallholders, who have historically seen improved food security outcomes as a result of increased incomes and access to food. However, food price volatility as a result of broader macroeconomic forces has made this relationship more tenuous with price spikes causing food insecurity in areas now dependent on food imports (Clapp 2009). With the primary focus on improving yields to serve these companies rather than to improve food access on the ground, the

[12] Author's calculation based on 11 latest company reports, ranging from 2016 to 2018.
[13] Author's calculation based on all Nestlé reports 2007 to 2017.
[14] Author's calculation based on Nestlé reports 2014 to 2017 (published in 2018).
[15] Interview with sustainability professional working at a Big Food company, 2018.

extension work focused on smallholders can have negative impacts on food security outcomes, whether it be through insufficient incomes to purchase food now priced out of reach, or through the loss of genetic diversity and culturally significant crops because of a focus on crops for company gain.

Simultaneously, the focus on key commodity crops has implications for biodiversity more broadly. The type of agricultural production associated with row crops and soy is often large-scale industrial, and linked with deforestation (Barona et al. 2010; Laurance 2007; Nepstad et al. 2014). The focus on a small handful of crops has also reduced overall dietary diversity globally (Khoury et al. 2014). Through their position as a major buyer of crops, and a large funding source to science, companies are shaping scientific priorities in their interest, but the outcomes that this pursuit has on other factors of rural livelihoods, environmental trade-offs that may be made as a result, or the dietary impacts of this type of production are not addressed by these initiatives. As a whole, the use of science and environmental measurement in Big Food firms, narrows the focus, and constricts the options for change.

The use of sustainability metrics provides important insights to these companies about the sustainability impacts of their activities overall, and the effects of specific products, but these are not released publicly, while often avoiding the question of consumption. Most companies see their role as simply providing choices to consumers, without regard for the intersecting issues of how those products impact their health and the environment at the same time. In one sense, efforts by consumers to buy more environmentally-friendly products opens new avenues for product innovation (explored in Chapter 6), without the need for explanation of the nuance on food's environmental impact, or even information regarding the narrow sustainability metrics that these companies collect. In this way, companies are attempting to download the responsibility for consumption change onto consumers, who are left to navigate complex and unclear messaging about the nature of food sustainability.

4.3.3 Policy Implications of Scientized Sustainability

The interplay between sustainable diets, key characteristics of the agrifood governance landscape and the way that sustainability is measured and prioritized have myriad policy implications for sustainable diets. This chapter has shown specifically, how diets may be measured and perceived as sustainable, the types of policies that may be prioritized when sustainability is seen through a scientized lens, and who may be responsible for encouraging more sustainable diets in the food system.

The chapter has focused on how food and beverage manufacturers are measuring sustainability through scientized ways of approaching the concept and data. As discussed in this analysis, the ways that sustainability is measured in these contexts will have policy implications for how diets may be assessed or perceived as sustainable. First, these measurements or data points determine what kinds of sustainability become the focus; a sustainability that is often narrow so that it can be easily measured. A growing body of literature insists that policy for food system resilience and sustainability must be more holistic – looking beyond simply those concepts that can easily be narrowed down to a data point for measurement (IPES-Food 2017b; IPES-Food 2015; Swniburn et al. 2019; Willett et al. 2019). This is also the intention behind the term as laid out by the original group of scientists at the 2010 FAO Bioversity International Symposium (Burlingame 2011).

The sustainability interpretations put forward by Big Food dependent on narrow measurements and single criteria may also ignore alternative visions of food system sustainability that do not fit within these conceptions or do not easily comply with their business model or values. Narrowed sustainability may also determine the way that the sustainability of a product is measured or perceived. For example, a company may choose to label a product based on a sustainability data point such as “low carbon emissions” because it works to their advantage and may sell more products. However, this one data point may ignore for example a high water footprint that went into creating that product. Finally, the use of efficiency metrics may work to the benefit of corporate actors and impact policy on sustainability labelling or governance.

The second major policy impact that results lies in the types of policies that are pursued as a result of scientized measures and single criteria sustainability. Studies have continuously shown

that information is not enough to change consumer behaviour (Bailey and Harper 2015; Mason and Lang 2017, 305). However, as a result of measuring sustainability in narrow and scientized ways, industry and governments are more willing to accept policy that encourages information campaigns and product labelling. These labels are more often than not the result of voluntary commitments that are privately governed and monitored, and focus on single ingredients, or may have few and vaguely defined criteria as seen throughout this chapter on the on farm assessments. These types of policy and governance choices to encourage dietary change perpetuate the challenging political and economic characteristics of the agrifood landscape that influence the environmental politics that result, particularly weak and fragmented governance and power inequities throughout the food system. Simultaneously, privatized governance may reduce space to think of alternatives to challenging current dietary patterns. As Mason and Lang (2017, 270) argue, "technical fixes deviate attention from the quicker 'solution' of consuming less". Similarly, narrowed sustainability deviates attention from more holistic multi-criteria approaches (Mason and Lang 2017).

Finally, as shown throughout this chapter, the ways that we measure and prioritize sustainability have implications for who is then expected to create the majority of change in the system. Scientized metrics have tended to put the onus and focus on farmers and consumers. These ways of measuring sustainability can similarly create the need for farmers and consumers to be the ultimate movers on sustainable diets. Industry initiatives on sustainable diets thus far (for example, the FReSH Initiative) have cited sustainable sourcing as a way that they can contribute to sustainable diets. As shown in the next chapter, this certainly has policy implications for a variety of actors and tends to make the focus of change farmers' production (Chapter 5) and consumer choices (Chapter 6).

Conclusion

The companies at the helm of major brands are recognizing the many environmental and social issues faced by society and are developing increasingly ambitious sustainability strategies to attempt to mitigate them while framing their role in promoting sustainability in the food system as legitimate. This chapter has sought to unpack how one aspect of these strategies – the use of scientized metrics – impacts the outcomes of 'sustainable diet' efforts going forward. Science

and data are the first step to shaping debates that are rolled into sustainable sourcing programs (Chapter 5), as well as the way that products are sold to consumers (Chapter 6).

This chapter has shown that Big Food companies are pursuing this particular aspect of their sustainability efforts in three major ways as demonstrated. First, companies are looking to quantify their efforts in reducing their impact and provide evidence for the approaches they have adopted through a variety of tools and metrics to show progress against their claims of legitimacy. Second, they are at the same time spending large budgets on science directed at solving some of the sustainability challenges present in their supply chains. Finally, they are engaging in knowledge transfer efforts where they require data from farmers about what how they are managing their land, soil and water, while at the same time providing farmers with information and scientific innovations that the farmers should be implementing. Simultaneously, they are using the metrics and science they have developed to communicate with their customers about the sustainability of their products.

These scientized sustainability strategies were then analysed using the conceptual framework to better understand how key features of the current agrifood landscape create space to utilize these strategies to attempt to legitimize their role in future food and sustainability. The work that Big Food companies are pursuing engages with ideational debates about sustainable food and shapes the meanings of sustainability in specific ways, framing certain visions as legitimate over others through the assumed objectivity of science and quantitative data. These narrow visions of sustainability may ignore or obscure certain environmental challenges in order to produce crops intended for ultra-processed food products. Simultaneously, they are using their instrumental power to manage large research and development budgets in a way that shapes scientific priorities around producing key crops, using sustainable methods that entail a particular vision of sustainable agriculture – one that may have implications for values that exist beyond efficiency gains. This work to improve the sustainability of agriculture makes farmers a key site of governance, and directs attention away from companies, the products they make, how they make them, and their consumption.

Science and quantitative data can provide extremely important insights for bringing about more sustainable food systems and diets. However, it is important to remain cognizant about the values that are inherent in this data, the way that it is used, and the arguments that it is supporting. A wide variety of factors will need to change to make sustainable diets a reality, and narrowing solutions based on the science of life cycle assessment, or the farming methods advocated by a company should be viewed with caution. By framing their work as legitimate using science and data, Big Food limits the ability of others to question their sustainability strategies, or characterize their actions as insufficient, while they continue to contribute to consumption of foods unnecessary to the diet.

Chapter 5 Sustainably-Sourced Ultra-Processed Foods?

Introduction

Sustainable sourcing has become one of the leading sustainability strategies in agriculture and food as a whole. Nowhere is this more prevalent than in the food and beverage manufacturing sector (Makower 2017). Sustainable sourcing is used by companies to continue to obtain their main or most threatened ingredients in a way that they define as responsible and sustainable, and can sell to consumers as products made ethical by the improved supply chains involved (Baldwin 2015; MacDonald 2014). However, as seen in Chapter 4, questions remain over what exactly a sustainably-sourced ingredient is, and who decides how that is measured. The following chapter will outline the current landscape of sustainable sourcing programs used by Big Food companies and illustrate the variety of ways that companies make this distinction. The work presented here expands on a paper that has been published in *Global Environmental Politics* (Scott 2018).

This chapter builds on the argument that Big Food's sustainability strategies are articulated in a governance context that creates space to make legitimacy claims while providing firms a number of opportunities to shape the discourse of sustainability and potentially subvert more progressive interpretations of sustainable diets. This agrifood governance context and sustainable diets debate also help in mitigating and downloading risks to continue the pursuit of growth. Big Food's use of sustainable sourcing is an attempt, intentional or not, to legitimate a particular vision of sustainability and sustainable agriculture while downplaying the role of other multi-criteria or holistic interpretations and concerns, such as consumption and health. Simultaneously, sustainable sourcing perpetuates weak and fragmented governance in the food system, which may help reinforce the legitimacy claims of corporations as actors in coordinating and strengthening governance for sustainability in complex and distanced supply chains (Clapp 2014; Biermann 2009).

Sustainable sourcing is part of the larger picture of what sustainability means to Big Food corporations and is particularly important in the context of sustainable diets given the way that this strategy shapes meanings of sustainability across supply chains. Sustainable sourcing is also a critical area where a variety of private governance mechanisms have perpetuated complexity

and weakened governance. This strategy builds on the findings of the previous chapter (Chapter 4), as sustainable sourcing has grown out of the use of life cycle assessments, and the push to consider agriculture as a key site for improvement. Sustainable sourcing certainly makes improvements, but it does not critically challenge the primary goals of these corporations, while at the same time creating openings for these companies to frame themselves as legitimate, to pursue risk mitigation, and value creation. Sustainable sourcing strategies create opportunities for ultra-processed foods to also be framed as part of a normal diet, while strengthening the enhancing corporate control over and governance of suppliers.

This chapter first provides an empirical overview of the key activities and approaches that fall under sustainable sourcing as a strategy for Big Food. The second section uses the analytical framework to interrogate the outcomes of these strategies focusing on how they work to define sustainability in the food system, and how Big Food may attempt to legitimate themselves through coordination of weak and fragmented governance. It then examines the implications of these findings for policy and governance on sustainable diets.

5.1 Sustainable Sourcing in the Era of Big Food

While Big Food firms have said little directly on the idea of sustainable diets, they enthusiastically pursue a variety of other sustainability strategies, with sustainable and responsible ingredient sourcing being a commonality. It is one of the few consistent strategies across companies, with all eleven of the top food and beverage manufacturers having sustainable sourcing goals and listing them as key materiality considerations (Table 5.1). Sustainable sourcing, like sustainable diets, could be characterized as a holistic sustainability strategy. Strategies that involve sustainable and responsible sourcing typically cover everything from land rights, to environmental improvements; fair labour practices and animal welfare, which are all part of working towards more sustainable diets. Yet, sustainable sourcing focuses on those aspects of sustainability that occur only upstream in supply chains and does not consider the impacts of these foods beyond their production – including waste, and health impacts related to the consumption of ultra-processed foods made with sustainably-sourced ingredients.

There are a range of goals put forward, based on a company's product-portfolio and focus. The number of goals and scope have grown over the last ten years from a specialized few ingredients to encompass a large percentage of the ingredients used by these companies (Freidberg 2017b). However, it is evident that there is variation in the level of effort and ambitions based on where a company is in its sustainability journey, with some much further along in working towards a comprehensive vision of sustainable sourcing.

Table 5.1: Sustainable Sourcing Goals of the Top Eleven Food and Beverage Manufacturers*

Company	Sustainable Sourcing Goals
Associated British Foods	Individual goals for palm oil, sugar, vanilla, spices, brazil nuts, tea and rice (ABF, 2017).
The Coca-Cola Company	By 2020, sustainably source key agricultural ingredients. (The Coca-Cola Company, 2016a).
Danone	Individual ingredient targets including lamb, beef, eggs, US direct milk, palm oil, soy and sugar.
General Mills	Committed to sustainably sourcing 100% of 10 priority ingredients by 2020. Representing more than 50% of annual raw material purchases. (General Mills 2017, 1).
Kellogg Company	"By 2020, responsibly source our 10 priority ingredients: cocoa, sugar cane, vanilla, palm, corn, wheat, rice, potatoes, beet and fruit" (Kellogg Company 2017a, 10)
Kraft Heinz	Establishing responsible farm-to-market ingredient and material sourcing policies and practices helps us deliver world-class products today and tomorrow (Kraft Heinz, 2017, 19). Has targets for specific ingredients (See Table 2).
MARS	Working to update its strategy. No defined deadlines at this point. "Our updated sourcing strategy will cover 23 raw materials, covering 60 percent of our sourcing volume." (MARS, 2015).
Mondelēz	- All cocoa will be sustainably sourced -75% of Western European biscuits volume made with Harmony wheat by 2015 -Transitioning to cage-free eggs in North America by 2020 and Europe by 202. -100 percent cage-free eggs in all European chocolate brands biscuit products sold in Belgium and the Netherlands and Miracle Whip dressing in Europe. -100% of palm oil will be RSPO by the end of 2015 (Mondelēz, 2015).

Nestlé	"By 2020: For Tier 1 suppliers, cover 80% of the total volume sourced from audited and compliant suppliers. By 2020: For upstream, 80% of the volume of our priority categories to be traceable, 70% to be Responsibly Sourced." (Nestlé 2017, 83).
PepsiCo	2020 and 2025 GOALS: Through PepsiCo's Sustainable Farming Initiative (SFI), sustainably source our direct agricultural raw materials by 2020; and sustainably source our nondirect major agricultural raw material ingredients by 2025 (PepsiCo 2017, 1).
Unilever	"We are committed to sourcing 100% of our agricultural raw materials sustainably by 2020." (Unilever 2015).

*Some goals have been edited for brevity.

Methods for achieving these goals are not the same between two companies, with all participating in a broad range of initiatives, which make up their strategies (Table 5.2). The sourcing focus has arisen for a variety of reasons. First, it derives from greater awareness of the impacts along supply chains, brought out by Life Cycle Assessment (LCA). The Sustainability Consortium, one of the first initiatives to focus on supply chains, worked to identify 'hot spots' for numerous product categories using LCA. In doing so, a focus on the many environmental and social sustainability issues occurring across supply chains has grown. Similarly, the 2017 Carbon Disclosure Project's (CDP) Supply Chain report calls the supply chain, "the new frontier in environmental responsibility" (CDP, 2017). In determining their environmental footprints, companies are being forced to look beyond simply what they are doing in their own operations to demonstrate that they are working on these other areas. Second, companies such as PepsiCo cite pressure from retailers as one of the reasons to pursue sustainable sourcing (PepsiCo 2016). The company requires its suppliers to follow its Code of Conduct, and in training materials points to buyers as a reason it needs suppliers trained (PepsiCo 2016). Third, the Behind the Brands (BtB) campaign by Oxfam, started in 2013, worked closely with firms to discover ways to improve their performance and pushed for consideration of numerous factors in supply chains. The campaign furthered the development of sustainable sourcing strategies. Finally, reputational risks and consumer sentiment play an increasingly important role in the certification schemes for certain crops – particularly cocoa, tea, and coffee that are Fairtrade, UTZ, and Rainforest Alliance certified (Cooper 2015). Consumers now have increased options and more access to

information on issues in these supply chains through social media, and NGO campaigns. A number of scandals have plagued certain ingredients and companies, including child labour in cocoa and seafood, and the destruction of rainforests related to palm oil production (Cooper, 2015).

The exact definition of a sustainably-sourced ingredient can vary. Companies that are more mature in their sustainability journey, for example, Nestlé and Unilever, have provided detailed documentation about the ways that they ensure sustainably-sourced ingredients, including individual commodity policies or broader agricultural codes for ingredients without formally established standards. Many companies have been active in creating agricultural standards through their own codes of conduct (Unilever 2010), or through the Sustainable Agriculture Initiative platform and AIM-Progress (the European food industry's agriculture and supply chain initiative). Most companies try to maintain flexibility in how they achieve their sustainable sourcing goals by accepting a variety of programs as meeting their standard (Nestlé 2016b; Unilever 2010). Palm oil is an interesting exception to this trend, with all companies participating in the Roundtable for Sustainable Palm Oil (RSPO) and using the Green Palm sustainable palm oil certification program (see Table 5.2).

Cocoa provides an alternative example, with many different methods of ensuring sustainability and a wide variety of initiatives having emerged. MARS, Nestlé and Mondelēz have been some of the most active companies to work on sustainable cocoa supplies. They have invested extensively to improve the commodity supply chain, given the importance of cocoa for their business. The Nestlé Cocoa Plan is a prominent own-brand ingredient sustainability initiative. It uses a combination of Fairtrade and UTZ certification, with Nestlé creating goals to provide cocoa plants and training to farmers, in addition to building schools (Nestlé 2016b). Nestlé has also used its 100% sustainable cocoa claim in sales efforts and promotions. MARS calls its cocoa sustainability plan the Sustainable Cocoa Initiative and has invested in cocoa research for plant improvements, while also providing training and plants to farmers. It also works with UTZ, Fairtrade International, and, Rainforest Alliance (Mars 2017). Unilever uses the Rainforest Alliance to certify cocoa for its Ben & Jerry's and Magnum brands (Unilever 2016). On the other hand, Mondelēz has its own-brand cocoa sustainability program called Cocoa Life, which uses

FLOCERT for certification of its supply chain (Mondelēz 2017b). The diversity of chocolate programs shows both the importance of this commodity and the lack of a single agreed upon standard.

Beyond palm oil, few consistent commodities are the strategic focus of all eleven companies as demonstrated in Table 5.2. Cage-free eggs have become an important commodity and common goal for companies that use them. This trend is largely driven by a convergence of advocacy, science, and consumer demand amid increasing awareness of the animal welfare issues in these supply chains (Greenwald and Woodhouse 2018). Soya has also gained attention from business and action is quite cohesive, with most companies using the Roundtable for Responsible Soy (RTRS).

A newer trend arises with the companies that are pursuing crops outside of the norm, and thus have more flexibility in how they define sustainability. Kraft Heinz has a business interest in tomatoes and follows the Global Good Agricultural Practices (GAP) Program, using its manual to initially work on food safety, but later turning to productivity improvements (Kraft Heinz, 2017, 28). Kraft Heinz cites the example of a Brazilian farmer who dramatically increased his yields after he was invited by members of the Kraft Heinz GAP team to its research farm, "where the company's proprietary tomato seed varieties are developed – to see firsthand how new equipment and irrigation practices could be used to improve the yields on his own farm" (Kraft Heinz, 2017, 28). Similarly, the Coca-Cola Company lists fourteen priority ingredients that include oranges, lemons, grapes, apples, mangoes, and stevia (The Coca-Cola Company, 2016a). None of these fruits or the sweetener stevia have sustainability certifications, and so the Coca-Cola Company defers to its Sustainable Agriculture Guiding Principles, a three-page document with very high-level recommendations (The Coca-Cola Company 2013; The Coca-Cola Company 2016a). Given the brevity of this document, it leaves much room for interpretation around what a sustainably sourced fruit might look like. Examples like Kraft Heinz's tomatoes and the Coca-Cola Company's fruit standards demonstrate more flexible interpretations of sustainable agriculture. At this level, companies work with farmers to become more sustainable and rely on continuous improvements to certify sustainably-sourced ingredients that may not be very different from a more conventional crop.

Recently, certain critical environmental issues have become a focus for global governance networks, and companies have turned more attention to them. For example, deforestation received renewed emphasis after the 2015 United Nations Climate Change Conference in Paris (COP21). Since then, companies with commodities most closely connected to deforestation in their supply chains have linked their efforts on sustainably-sourcing these ingredients to the issue of deforestation specifically. The most obvious example of this is palm oil, which is one of the largest contributors to deforestation related climate change. Beef and soy production have also played a significant role in deforestation with some companies, such as MARS Inc., making pledges to only source beef from suppliers who meet the Brazil Forest Code, and demonstrate that beef from the Amazon biome is not associated with primary forest clearance (MARS Inc. n.d.).

A number of companies have also created targets related to seafood (not featured in Table 5.2 due to space limitations). The Marine Stewardship Council (MSC) tends to be the standard in this category, with most companies working with MSC on sustainable sourcing of seafood. Mars is a big user of seafood in its pet food lines. The company outlines a 4R strategy to: reduce the amount of fish it uses; replace endangered species with sustainable alternatives; reassure customers by working with trusted partners; and respect human rights in its supply chain (MARS Inc. 2018a). Alternatively, for sustainably-sourced seafood, Kraft Heinz notes that it has partnered with the Tuna Store[16] to ensure quality, sustainable and traceable fish – with the Tuna store controlling every link in the supply chain (Kraft Heinz 2017).

The number and scale of supply chain initiatives that have emerged, and are shown in Table 5.2, demonstrate the attention that is being put on corporate supply chains. As major buyers of ingredients, companies are carriers of strategic knowledge about the nature of their supply chains – the ingredients, the regions, and the suppliers that make up these complex webs. This role gives them important power in the governance of these supply chains.

[16] The Tuna Store is "a vertically integrated supplier of private label and branded consumer packaged cans and pouches, and fresh, frozen and Ultra Low Temperature (ULT) seafood products" (The Tuna Store 2018).

Table 5.2: Sustainable Sourcing Ingredient-Specific Programs and Sustainability Measures

	Cereals and Grains	Cocoa	Coffee	Dairy	Meat, Poultry, Eggs	Nuts	Palm Oil	Rice	Soya	Sugar	Tea	Vanilla
Associated British Foods						Brazil Nuts - Working on assessment in supply chains. Aim to develop a framework for wider industry collaboration	RSPO – Green Palm Certificates	Sustainable Rice Platform (SRP)		ABF programs, some Fairtrade certification. Not a member of BonSucro	Sources from Rainforest Alliance, UTZ certified, or Fairtrade. Monitored in line with ETP Global Standard.	Sustainable Vanilla Initiative (SVI)
The Coca-Cola Company [17]			Compliance with one of: Rainforest Alliance, UTZ, Fairtrade, SAI Platform, 4C w/ addtnl criteria, or standards approved by TCCC, SAGP third-party audited				RSPO		Coca-Cola Company Sustainable Agriculture Guiding Principles (SAGP)	All sweeteners, including Cane Sugar, Beet Sugarm Corn/High Fructose Starch Syrup, Stevia	Compliance with one of: Ethical Tea Partnership, SAI Platform, UTZ, Rainforest Alliance, Fairtrade, SAGP third-party audit	
General Mills[18]	Oats - Documented continuous improvement using industry-environmental metrics U.S. Wheat, U.S. Corn - Documented continuous improvement using FtMar comp metrics	Currently partnered with Cargill's Cocoa Promise Program with CARE in Cote d'Ivoire and Barry Callebaut's Cocoa Horizon's program. Members WCF.		U.S. Dairy (fluid milk) Documented continuous improvement	Cage-free or free-range eggs globally by 2025. In 2015, we committed to work toward this goal for U.S. and Canadian operations. *Not one of its 10 priority ingredients.*		RSPO – Combination of mass balance, fully segregated and Green Palm Certificates. Works with Proforest for verification.			U.S. sugar beets - Documented continuous improvement using FtM Sugarcane - Sourced from verified low risk regions compliance with Bonsucro or comp. standards in high-risk regions		Direct investment at origin. Partnered with NGO Positive Planet and collaborates with main supplier Virginia Dare and industry group SVI

[17] (Coca-Cola Company 2013; The Coca-Cola Company 2016c)
[18] (General Mills 2017, 2018a)

	Cereals and Grains	Cocoa	Coffee	Dairy	Meat, Poultry, Eggs	Nuts	Palm Oil	Rice	Soya	Sugar	Tea	Vanilla
Kellogg Company [19]	Continuous improvement for corn, wheat using Field to Market	World Cocoa Foundation WCF, WBCSD Climate Smart Agriculture					RSPO - combination of Mass Balance, Green Palm Certificates and Fully Segregated	Continuous improvement on metrics as appropriate.	Member of RTRS – Soy NOT a priority ingredient	Bonsucro		Direct investment to "the places where [it is] grown"
Kraft Heinz[20]		UTZ Certified Cocoa	partnered with TechnoServe, helping those in the developing world strengthen business and technical skills. Together, we're assisting 2,000 smallholder coffee farmers in Honduras	Requires that suppliers be members of Farmers Assuring Responsible Management (FARM), Dairy Processors Association of Canada (DPAC), and are running a program of workshops in India for its Aligarh factory	Elimination of Gestation Stalls for Pregnant Sows by 2025, Cage-Free Environments for Egg-Laying Hens by 2025, Increased Welfare for Broiler Chickens by 2024 Meat Supplier Risk Assessment		RSPO – 100% certified sustainable, 79% RSPO Segregated _ Mass Balance and 21% RSPO Credits 90.24% traceable to mill Partnered with RA on implementing its Palm Oil Sourcing Policy					
Nestlé[21]	In assessment phase	Nestlé Cocoa Plan – using Fairtrade and UTZ Certification	NesCafé Plan, 4C Code of Conduct, Nespresso AAA Sustainable Quality Program	Responsible Sourcing Guidelines in Partnership with World Animal Protection and audited by SGS	Based on Nestlé Responsible Sourcing Guidelines in partnership with World Animal Protection and audited by SGS	Hazelnuts, audited by FLA – sustainability definitions unclear	RSPO		(RTRS) certification and the Sustainable Agricultural Network (SAN) certification accepted as compliance with the RSG.**	Bonsucro, Sustainable Agriculture Network and demonstration of compliance with RSG for uncertified sugar beet, working with Proforest for Certification**		Responsibly Sourced is synonymous with sourced through a supplier with improvement programmes in place

[19] (Kellogg Company 2017b)
[20] (Kraft Heinz 2017)
[21] (Nestlé 2013, 2018d, 2018b, 2015)

	Cereals and Grains	Cocoa	Coffee	Dairy	Meat, Poultry, Eggs	Nuts	Palm Oil	Rice	Soya	Sugar	Tea	Vanilla
MARS[22]	Corn – supply chain mapping	UTZ, Rainforest Alliance and Fairtrade Certification. Working with European Committee for Standardization and ISO to create global standard for Cocoa.	Rainforest Alliance and UTZ Certification	Dairy Working Group of SAI. AIM-Progress, TSC Innovation Center for U.S. Dairy	100% of the beef we purchase in Brazil will be from suppliers that comply with the Brazil Forest Code	Peanuts – U.S. Peanut Resources and Efficiency Measures, American Peanut Council Sustainability Task Force	RSPO, working with the Forest Trust to improve traceability. Supply chain mapping. 90% traceable back to mill.	SRP	Mars is a member of CGF and supports the group's standards "The Sustainable Soy Sourcing Guidelines. "	Member of Bonsucro. Working with suppliers to ensure sugar is sustainable produced. Fairtrade sugar used in Maltesers in the UK. All sugar meets AIM-Progress requirements.	Rainforest Alliance and UTZ Certification, Ethical Tea Partnership	No clarity on sustainability definition. Note that it currently gets vanilla from 1,000 small scale farmers.
Mondelēz 23	Harmony Wheat (Company program)	Cocoa Life		Dairy Sustainability Framework, works with Red Tractor on Dairy Sustainability in UK	Cage-free eggs		RSPO traceable back to mill					
PepsiCo[24]							RSPO with additional requirements for certain parts of the world			Bonsucro certification for cane sugar	Rainforest Alliance Certified	
Unilever[25]		Rainforest Alliance Certification		Meets Unilever Sustainable Agriculture Code, works with World Animal Protection.	Cage-free eggs.		RSPO Working towards 100% traceable/ segregated		RTRS certified soy, certificates and self-verified soy oil	Bonsucro credits purcharsed. Working with supply chain partners. SAI Platform Farm Sustainability Assessment.	Rainforest Alliance Certified and trustea verified	

Chart includes commodities where at least three companies have goals. Grey blocks are used where companies have no specific commodity goal or have not been explicit about how they define or certify sustainability. Danone is not included in this chart because it is currently updating its sustainable sourcing strategy.
** Also accept traceable commodity from smallholders and growers who are not yet compliant but who have an action plan and time line in place for meeting Responsible Supplier Guidelines.

[22] (MARS Inc. 2018c)
[23] (Mondelēz 2017b, 2015, 2017a)
[24] (PepsiCo 2017)
[25] (Unilever 2018f)

5.2 Sustainable Sourcing in the Context of Global Food Governance and Sustainable Diets

The use of sustainable sourcing as a major sustainability strategy is not inherently at odds with achieving more sustainable food consumption and diets, and indeed might be a major part of realizing more sustainable food systems. However, when analysis is conducted on the strategies and the ways they may influence governance using the conceptual framework, their contribution to sustainable diets is put into question. As currently pursued, sustainable sourcing perpetuates a weak and fragmented global governance system and a narrow discourse of sustainable diets while ignoring other facets of the intended concept. Together, these effects may make achieving more sustainable consumption, and more sustainable food systems more challenging in the long run, while Big Food firms are able to claim legitimacy as actors that are pursuing food sustainability and security. Below, I draw on the analytical framework presented in Chapter 3 to discuss how power and legitimacy interact to provide opportunities for shaping the way sustainability is defined in the context of supply chain initiatives used by Big Food companies.

The analysis for this section used the analytical framework (outlined in Chapter 3) as a heuristic to consider the ways that political and economic features of the current agrifood landscape intersect with debates about sustainable diets, and the phenomenon of sustainable sourcing strategies and goals used by Big Food corporations. A focus on legitimacy is also used to contemplate the role of legitimacy in ideational debates about sustainable agriculture and what makes a sustainably-sourced ingredient. This analysis also helps in understanding the types of legitimacy, whether it be process legitimacy that derives from the way that certain governance mechanisms are organized, or the source-based legitimacy that may come from working with NGOs perceived as credible to stakeholders. Importantly, ideational legitimacy and the concept of "thick and thin legitimacy" was vital to understand how technical debates in agriculture may be framed in such a way that alternative agricultural production practices, such as agroecology, are not seen as viable (de Wit and Iles 2016).

For the second section of the analysis, the analytical framework was essential to unpack various forms of power within the governance system for sustainable sourcing, and how they contribute to giving Big Food coordinating authority over governance within a fragmented landscape.

These insights would not be possible without understanding the theoretical contributions of the literature on the global environmental politics of food and agriculture. The insights from the analytical framework demonstrated important characteristics of the global agrifood landscape that matter for governance and allowed for the analysis of the sustainable sourcing activities to understand how they might create further complexity and distance, or further fragment the governance landscape. Sustainable sourcing activities' potential contribution to fragmentation illuminates how space is created for corporate actors to take on a coordination role in this realm, and to present themselves as a legitimate part of future food security and sustainability.

The following sections will first explore how sustainability is shaped through the various sustainable sourcing initiatives. Second, an interrogation of how complexity and distance contribute to and reinforce weak and fragmented governance will show how this enables Big Food firms to emphasize ultra-processed foods and work to enhance the growth of their business and their position as actors contributing to improvements in the food system.

5.2.1 Sustainable Sourcing: Defining Sustainability in Supply Chains

Corporations use numerous means to achieve legitimacy as demonstrated in the introduction to the framework in Chapter 3: managing norms, associating with institutions and standards that may be perceived as legitimate, anticipating changes in norms, and communicating their practices using various discursive strategies (Dowling and Pfeffer 1975; Joutsenvirta and Vaara 2015; Pollach 2015). These strategies have been practiced extensively in the global food and agriculture sector, documented by academics (Clapp and Fuchs 2009). However, Big Food has received less attention in the literature on power and legitimacy in global food governance. Ideational debates as features of the global agrifood governance landscape, provide ample opportunity for companies to participate in shaping discourse as a critical part of their constant work on gaining and maintaining legitimacy. The following section outlines some of the ways that Big Food is shaping discourse in order to attempt to legitimize a particular vision of sustainability that makes them important actors in achieving sustainable and secure food systems.

Global food and beverage manufacturers are increasingly partnering with development and civil society organizations and are concurrently tying their work to the Sustainable Development Goals (SDGs). Much of this work is done in the process of creating and engaging with sustainable sourcing governance mechanisms, like those shown in Table 5.2. These ties to civil society and intergovernmental processes can enhance process-based (input) legitimacy for these corporations (Karlsson-Vinkhuyzen and McGee 2013). This type of work shows firms as cooperative with critics and gives them the opportunity to highlight their rankings in these initiatives as proof of the good work they are doing. It also reduces the risk of backlash, as they work closely with a variety of non-governmental partners, including Oxfam, WWF, World Resources Institute and more. For example, the top performers on the Oxfam scorecard often emphasized their ranking in the BtB exercise in their CSR reports (Nestlé 2017; Unilever 2016). The Behind the Brands campaign also leant legitimacy to Oxfam itself, attaining accolades for the campaign, with *the Guardian* naming it one of "the best sustainability campaigns of 2014", and commending the organization as, "one of the few NGOs that seems able to balance the use of carrot and stick with major corporations, calling out bad performance while still celebrating the good." (Buckingham 2014). Even so-called 'laggards' on the BtB scorecard, highlighted their improvements at the end of the campaign in 2016. For example, page five of the Kellogg Company's 2015 sustainability report is used to celebrate its accolades, explicitly linking its work to the BtB campaign and other NGO initiatives (eg. The SBTi, discussed in Chapter 4). It starts, "Through the execution of our 2020 Global Sustainability Commitments and our science-based emission targets to 2050, we have garnered recognition from partners and stakeholders around the world." (Kellogg 2016, 5). Alignment with these campaigns may enhance legitimacy but many questions remain unanswered about the precise actions undertaken, and the definitions used by the various campaigns and initiatives and perpetuated by the Kellogg Company.

What does it mean for an ingredient to be sustainably and responsibly sourced? Here ideational debates about the nature of sustainability, as outlined in the framework become apparent. Companies, including Unilever, Nestlé, General Mills and Kellogg Company have been applauded for pushing the agenda on sustainable agriculture (Grady 2016). Unilever has been discussing sustainable agriculture for nearly twenty years, as one of the earliest companies to look into its supply chain. Yet, beyond company efforts, sustainable agriculture is still contested

and highly context specific with a variety of actors weighing in with opinions on the subject (Lang 2010, also see Chapter 4). Superficially, it appears that these companies have succeeded in securing a multiplicity of mechanisms to assure consumers, governments, and civil society that their ingredients are, or will be sourced sustainably. However, that act of shaping sustainability from the beginning of a governance process may allow actors to claim legitimacy when they then meet those standards. The financial position of Big Food, part of their material power, provides them the opportunity to participate in a wide variety of initiatives, seen in any of their CSR Reports. This extensive involvement in different initiatives gives voice to their preferred sustainability narratives. A number of scholarly studies have shown that large certification roundtables and initiatives have provided ample opportunities for Big Food to be part of shaping sustainability meanings (Jaffee and Howard 2010; Richardson 2015; Schouten and Glasbergen 2011). Unilever in particular has had a seat at the table for all of the major commodity roundtables from the get go, and in doing so has been able to show up with standards in hand that become the starting point for discussion (Dupont-Nivet et al. 2017).

Multiple technical debates persist on the role of genetically modified organisms (GMOs), monoculture production, new technologies and Big Data collection. These debates are brought into the various initiatives around sustainable agriculture. De Wit and Iles (2016) argue that industrial agriculture possesses "thick legitimacy" in these cases (de Wit and Iles, 2016, 2). Within sustainable sourcing forums, the thick legitimacy of industrial agriculture works against alternatives, requiring them to find unique ways to gain legitimacy, only occasionally succeeding. For example, discourses from certain actors that did not agree with the use of GMOs or monoculture production as part of a sustainable soy future were excluded in the roundtable process from the outset. Their vision of sustainability which was opposed to the use of these technologies held no legitimacy in the process, established from the beginning in rules that these would be accepted as sustainable (Schouten, Leroy, and Glasbergen 2012). Likewise, the Roundtable on Sustainable Palm Oil (RSPO) initially included the conversion of peatland and secondary forests as acceptable in its standard, a contentious position that did not receive consensus among members and was eventually overturned (Richardson 2015). Most companies have also abandoned this exception and demand palm oil that is not cultivated on converted land (WWF Palm Oil Scorecard). Debates like these are important in establishing what a sustainable

food future looks like. The active exclusion of discourses that oppose certain technologies or modes of agriculture permits standards that are shaping the accepted meanings of sustainability going forward, and narrows the conversation to include only certain visions.

Big Food corporations sell the vision of sustainable sourcing as having improved outcomes for the lives of farmers and companies insist that sustainably sourced ingredients will lead to more sustainable agriculture. However, varieties of alternative visions of sustainable food systems exist. While there is not space in this thesis to interrogate all of them, literature on agroecology, organics production, local and shorter food chains, and urban agriculture all provide another vision to the industrial agriculture, so often the backbone of ultra-processed food production (Altieri 2009; Gliessman 2015; Vandermeer and Perfecto 2017; Holt-Giménez and Altieri 2013; Renting, Marsden, and Banks 2003; Carey 2013; Blay-Palmer, Sonnino, and Custot 2015; Beuchelt and Virchow 2012). Additionally, concepts like the right to food, and food sovereignty speak not only to the sustainability of food systems, but the power dynamics within them, while at the same time being critiqued and evolving (Agarwal 2014; Beuchelt and Virchow 2012; Wittman, Desmarais, and Wiebe 2010). While corporate actors have engaged with some of these concepts, including organics, and more recently regenerative agriculture. They do not engage as deeply with the social and justice aspects of these alternative visions and movements, as this would likely contradict their profit motive.

At the same time, as explored in Chapter 4, many Big Food companies use their material resources, funding research to improve farming and deliver crop science innovations. These advances are part of their efforts to continue to source their supplies sustainably. Mars and Nestlé have pursued improved yields and less vulnerable cocoa trees (Mars 2017; Nestlé 2017). General Mills works with several agricultural science universities to improve the yields of key crops (General Mills 2017). Efforts to improve plant genetics and farming practices may well deliver improvements to agricultural sustainability, but they simultaneously work to dismiss alternative visions of future food while adding to the thick legitimacy of more industrial production. These initiatives also work in tandem with wider industry efforts, including the Field to Market program, also discussed in Chapter 4. Field to Market emphasizes continuous improvement, rather than absolute reductions or transformative changes (Freidberg 2017b). Continuous

improvement methods deny visions of alternatives that may take more drastic efforts and play into dominant ideas about growth and human domination of nature.

Sustainable sourcing perpetuates the idea that continued growth is possible, and that decoupling can occur at a rate that would bring us in line with the necessary changes required to meet planetary thresholds. Most companies feature growth as an important factor in pursuing sourcing in the first place, and all of them discuss future business growth goals. For example, the Coca-Cola Company states, "As Coca-Cola aims to grow its global juice business significantly by 2020, sustainably sourcing fruit for its juice products becomes increasingly important." (The Coca-Cola Company 2016c). Similarly, Kellogg Company representatives presenting at a sustainability conference framed sustainable sourcing strategies as an area for growth, noting that aspirational customers increasingly demand environmentally sound and ethical products (Kellogg 2014). Unilever extols the benefits of its sustainability efforts with its 26 "Sustainable Living" brands growing 46% faster than the rest of the business in 2017 and delivering 70% of Unilever's turnover growth (Unilever 2018g). The company's report called, "Making Purpose Pay" demonstrates how sustainable living brands are tapping into a desire from consumers to purchase more sustainable products (Unilever 2015b). Paul Polman, Unilever's CEO has been vocal about his desire to do business differently and uses the growth of sustainable living brands to defend his position. He is quoted, "Ever since we launched the USLP in 2010 we have reported openly on our progress. We have made great strides in meeting many of the ambitious targets we set ourselves and the fact that our sustainable living brands are continuing to deliver growth shows that this is a business model that works" (Unilever 2018g). Discourses of growth, combined with continuous improvement over absolute reductions, maintain a sustainability that is "fundamentally limited" (Dauvergne and Lister 2012). The need for Big Food to grow has led to efforts that are less transformative, enhancing the existing thick legitimacy and dominance of the market and industrial agriculture.

5.2.2 Coordinated Governance in a Complex World: Responses to Distance and Fragmentation

The following section focuses on the interconnected nature of elements of the analytical framework. As discussed previously, this framework provided a useful heuristic to think through

how the various characteristics of the agrifood landscape connect, and the theoretical insights of other scholars on each of these features were instrumental to considering the role of sustainable sourcing strategies within this broader context of debates on sustainable diets. Additionally, a focus on understanding legitimacy provided useful insights on the ways that political and economic features of the agrifood landscape may create space for Big Food to make legitimacy claims about their role in promoting sustainable food systems. Weak and fragmented governance is particularly problematic given complex and distanced supply chains. However, corporate actors are able to use their power in this system to coordinate governance and attempt to enhance their legitimacy.

Technical standards that were developed from the 1930s onward provided the conditions for companies to build ever expanding complex supply chains while ensuring quality and safety conditions (de Wit and Iles 2016). But, as supply chains expanded over time, weaknesses and risks were revealed, necessitating the development of the sustainable sourcing seen today. Standardization enabled complexity and created the need for responsible sourcing where further standards and certifications are required. As a result, a variety of sustainability governance mechanisms have emerged—many market-based, such as, product certification schemes (Auld 2014; Fortin 2013; Hatanaka and Busch 2008). Companies have drawn on sustainable sourcing as a method to manage risks, with vulnerable ingredients that are sourced globally overseen more effectively, with more checks and balances along the way, and more actors working to ensure compliance. Kevin O'Donnell of General Mills reiterates this, stating that the driver for sustainable sourcing is "really all about supply chain resiliency, making sure that we can continue to deliver the raw materials that our business depends on to thrive and to grow. It's also about risk reduction" (Khalamayzer 2017). Similarly, global sustainability director at Mars, Kevin Rabinovitch, states that decisions are made based on "a combination of how important the raw material is to the business. Certain geographies with higher risks — whether they be social, environmental or political — need to be scrutinized more closely to make sure we are working with the good guys" (Idle 2014).

Sustainable sourcing provides Big Food firms a measure to guarantee that they are reducing their risks, working with the "good guys" and able to continue to grow their companies, securing the

commodities required to do so. Big Food firms hold a powerful position as buyers in which they can decide to walk away from underperformers. Rabinovitch states that MARS intends to push the "bad guys" to better their performance: "Business can be a great force for driving positive social change. We need to figure out how we can do more of that" (Idle 2014). Globalized and vulnerable value chains are complex and in their efforts to bring resilience to their supplies, these companies have positioned themselves as leaders in this field. Immense growth in initiatives has created a fragmented range of certifications and standards with implications for the long-term environmental benefits of these programs. In a fragmented landscape, managing a variety of issues becomes increasingly challenging, as corporate actors may face multiple and conflicting legitimacy and accountability demands leading to "multiple accountabilities disorder" (Koppell 2005).

In this fragmented landscape, vast selection and complexity gives companies the ability to choose their focus for ingredients, issue areas, and jurisdictions and to switch between these foci at will. Sustainable sourcing attempts to take on a variety of interconnected but different issue areas, intersecting with diverse regime complexes in the meantime. This added layer of complexity makes for conditions favorable to forum-shopping – where companies may seek the venue most favorable to their position (Raustiala and Victor 2004). Companies have flexibility to control which suppliers are included in the marketplace due to their buying power. Demonstrating this complexity and variation, cocoa has generated a wide variety of sustainability programs. Cocoa is indicative of the fragmentation of some ingredient governance mechanisms, and this fragmentation can lead to weak and poorly enforced governance which is demonstrated by continued issues with child labour in the commodity chain (Cole 2014). The variety of certifications and labelling schemes in cocoa can also leave consumers confused, having implications for the ability of labels to make concrete consumption changes a reality (Fischer and Lyon 2014; Grunert et al. 2014).

Apart from confusion over labelling, sustainable sourcing provides a platform for Big Food to sell its sustainability credentials, which will be explored more in Chapter 6. Nestlé has poured money into advertising its efforts to produce chocolate bars with 100% sustainable cocoa. To do this, it has used in-store advertising and chocolate displays, labelling, and has also enlisted

YouTube influencer and travel vlogger, “Fun for Louis” to promote the Nestlé Cocoa Plan (Nestlé 2016c). The company also advertised heavily prior to introducing one hundred percent sustainable cocoa in the U.K. with press releases and consumer campaigns (Ritchie 2014). However, selling sustainable sourcing in this way is made possible by taking advantage of distance in the food system. Citizens are increasingly disconnected from the production of what they purchase, and unable to verify conditions on the ground, so are left to trust companies when they purchase a product that has a claim like 100% sustainable cocoa (Clapp 2014; Princen 2001). Distance acts in two ways, as it creates a legitimacy challenge for companies trying to achieve transparency but can also benefit those companies if consumers have already decided they are trustworthy or do not care to investigate the sustainability claims.

Increasingly, industry itself is recognizing that fragmentation of governance efforts can also be problematic. The Global Social Compliance Programme is an effort of the Consumer Goods Forum to improve on the inefficiencies caused by the, “proliferation of codes, audit duplication and divergence of approach” (The Consumer Goods Forum 2017). Their work seeks to harmonize the existing efforts while highlighting best practices, common approaches and creating equivalence. Specific to the food and beverage manufacturing industry, AIM Progress has emerged. Working with AIM the European Brands Association and the Grocery Manufacturers Association in the United States, AIM Progress was developed and is supported by membership of, among others; all top ten food and beverage manufacturers. The main goal of the forum is stated as, “Positively impact people’s lives through our combined leadership of robust responsible sourcing practices throughout our supply chains” (AIM-Progress 2017). They purport to do this by building supply chain capability, assuring compliance, and driving continuous improvement. All of these are admirable goals, but importantly, AIM-Progress has made mutual recognition and collaboration the cornerstones of its approach.

While AIM does not necessarily advocate for one certification program or way of creating “sustainable and responsible” ingredient supply chains, it allows manufacturers to work together to increase the number of suppliers that will be audited and measured by the same standard across all platforms. To do this, AIM Progress has adopted Sedex Members Ethical Trade Audit (SMETA) which is now used by the majority of the Big Food companies to certify, particularly

those ingredients that are not part of a formalized ingredient scheme (AIM-Progress 2017). By moving to use SMETA across their sourcing strategies, companies are provided flexibility with the ability to switch schemes, and move to different suppliers given noncompliance. Sedex has also worked closely with the SAI Platform to further harmonize auditing of agricultural practices (SAI Platform 2016).

Participation in these convergence efforts gives corporate actors a great deal of ideational power and provides opportunities to not only shape the governance of their supply chains, but to control them collectively, giving actors downstream little choice but to comply with their proposed means of auditing. While convergence would appear to be a benefit, it is important that a variety of actors, beyond just the corporations to be governed be involved in deciding what coordinated efforts should be recognized. The drive for convergence is a way for Big Food to garner support for reducing the negative impacts of fragmentation, while gaining more control of global supply chains to reduce risks to their supplies and reputation. Companies can gain powerful leverage while downstream suppliers and smallholders have a precarious place of uncertainty in the supply chain.

Big Food efforts to participate in ideational debates and governance convergence require continued examination because of their own legitimacy claims, detailed in Chapter 3. Sustainable sourcing is a key component to building legitimacy and social license, where companies can show the work they are doing to improve their supply chains. It is in this work that the vast majority of their most ambitious reforms and largest claims regarding the livelihoods of communities, and the sustainability of their ingredients occur. However, sustainable sourcing leaves out important elements of sustainability, and questions of consumption. Perhaps most importantly, sustainable sourcing does not deal with the health issues of ultra-processed foods. The complex and interwoven nature of health claims and sustainability claims that result from the sourcing initiatives highlighted here and science of data in Chapter 4 will be explored further in Chapter 6 at the consumer stage.

5.2.3 Policy Implications of Sustainable Sourcing Strategies

As in the previous chapter, it is important to consider what the analysis means for policy related to sustainable diets. The high prevalence of sustainable sourcing as a strategy in the food sector (Makower 2017) alone has policy implications for sustainable diets. Companies in food and beverage manufacturing have already pointed to sustainable sourcing as a way that they are contributing to making diets more sustainable (WBCSD et al. 2018). The popularity of this type of governance has important implications for what kind of policy we will continue to see in the future of sustainable food and diets, how those policy and governance mechanisms are defined and operationalized, and finally, who is responsible and who is in charge.

Sustainable sourcing has thus far been consistently done using private and voluntary governance mechanisms, although they may take various forms (as described by Auld et al. 2008). Private governance for sustainability has been well studied, with many scholars finding that these governance mechanisms tend to be weaker, more prone to conflict of interest, have unintended effects and lack monitoring (Borck and Coglianese 2009; Hatanaka and Busch 2008; Auld 2014; Fortin 2013; LeBaron et al. 2017; van der Ven et al. 2018; Clapp 2017; Oosterveer et al. 2014). With sustainable sourcing becoming an accepted norm for how Big Food companies will address sustainability of their products, all of the considerations that come along with private governance must be considered. For example, it becomes less likely that governments will act to enforce the particulars of the governance companies use in their supply chains. California attempted to deal with one prominent issue – child and forced labour – in supply chains with their *Transparency in Supply Chains Act of 2010* (Ball et al., 2015). However, a recent study found that compliance varied greatly, and that enforcement is lacking (Ball et al. 2015; Messinger 2016).

Beyond the bigger picture of what policy and governance is accepted, the prominence of private sustainable sourcing programs has implications for the ways that sustainability is defined and operationalized within these processes. The analysis presented in this chapter, and linked to Chapter 4, has demonstrated the various ways that technical debates about production sustainability play out within these programs, often leading to more industrial forms of agriculture. It also highlights the importance understanding legitimacy of ideas within the

context of uneven power and weak and fragmented governance. The legitimacy of ideas also becomes even more important when understanding the role of alternative visions within sustainable sourcing mechanisms, with few mechanisms adopting visions of agriculture that align with more progressive agroecology, which holds weaker legitimacy (de Wit and Iles 2016).

Finally, the analysis in this chapter begins to reveal the important policy implications that arise when corporate actors begin to play a coordination role within a weak and fragmented governance landscapes. Companies are in a position to choose between suppliers, making them responsible to comply. They are also then in a great position to shape definitions of sustainability, and methods for verifying compliance. Bailey and Harper (2015) in a report on policy interventions for sustainable diets highlight the consequences of not considering the macro context and the indirect and cumulative impacts of decision-making in policy for sustainable diets, much of which is being left out in narrowly defined sustainability schemes.

Conclusion

The current agrifood landscape, characterized by complex and distant supply chains, fragmented and weak governance, and ideational debates that are contested by different powerful actors, creates the backdrop for discussions of sustainable eating. This background generates the conditions for companies to attempt to put forward a vision of sustainability that makes progress but does not threaten their business. Sustainable sourcing is a popular strategy that is shown here to take advantage of space created by the current agrifood landscape to define sustainability in narrow ways and allow Big Food to claim legitimacy as powerful actors in the future of sustainable food systems.

Sustainability in the context of sourcing is on one hand "holistic", encompassing a wide variety of issues from equity, to labour, to environmental impacts into one tidy strategy. On the other hand, sustainable sourcing initiatives do not deal with questions of consumption and health, doing little to problematize ultra-processed foods in diets. Instead, sustainable sourcing provides an avenue for Big Food to participate in and shape discourses around the meaning of sustainable agriculture, and sustainability in the context of growth. A focus on sourcing also creates space for Big Food to coordinate complex and fragmented governance to their advantage by

coordinating measurement efforts through SMETA, and taking advantage of distance, severing feedback loops and opportunities for transparency. These efforts act as an important source of risk mitigation, reinforcing these foods in diets, and ensuring that these companies can source vulnerable ingredients into the future. Importantly, the presence of Big Food in the process of coordination also reinforces their ability to claim legitimacy as actors making a difference in the food system.

Big Food's concentration on sourcing as a means to solve sustainability issues matters because of the legitimacy claims (Chapter 3) that these companies make while collectively being one of the biggest influences in globally shifting diets. Companies are positioning their work as part of efforts to improve food security and sustainability, partnering with organizations in these efforts, and touting these matters as part of their mission. However, their discursive and coordinating efforts are actually leading to what many analysts consider to be weaker conceptions of sustainability in the food system, along with weaker governance. Ultimately, these outcomes are reinforcing conclusions made elsewhere about the nature of private governance in the food system: necessary changes are not being made to create truly sustainable and healthy food systems (Fortin 2013; Fortin and Richardson 2013; Richardson 2015; Auld 2014).

Chapter 6 Sustainable Diets by Design: Product-Portfolio Management and the Art of Marketing

Introduction

Big Food companies face pressure to change, with customers increasingly wary of processed and packaged offerings, governments compelling them to reign in salt, sugar, and fat to "fight obesity" and the Sustainable Development Goals (SDGs) targeting a number of areas related to their business. The narrative of sustainable and healthy diets is also reaching more people, in newspapers, civil society campaigns, and political battles over changing dietary guidelines. As shown in the previous chapters, Big Food is engaged in a wide variety of sustainability activities to change their operations, but companies are also pursuing another route to transform their business – product-portfolio management (Jugend and da Silva 2014). Product-portfolio management involves the strategic decisions made by companies on new product development, but also defines revisions, updates, and discontinuation decisions made in portfolio companies (Jugend and da Silva 2014). Much of the activity in product-portfolio management by Big Food has been in response to the evolving market for their products. However, there is great variability in the approaches to stay relevant and profitable based on where a company is in its sustainability journey and the current make up of its portfolio.

This chapter explores the implications of product-portfolio management strategies for the achievement of sustainable diets. Based on the analysis, it argues that product-portfolio management is used to align strategy on sustainability with the continued direction of the business, but that this makes achieving more sustainable diets containing fewer processed foods more challenging in two ways. First, product-portfolio management serves corporate actors to subvert a progressive interpretation of sustainable diets, by allowing them to claim legitimacy based on their corporate visions of sustainable food. These visions of sustainable food are perpetuated by the ways that corporate actors are defining sustainability, as shown in Chapter 4, and the weak and fragmented private governance that is explored in Chapter 5. Simultaneously, these narrow approaches to sustainability create space to for Big Food to frame themselves as legitimate investors in innovation that will positively impact food system outcomes. Second, product-portfolio changes reinforce individualized responses to sustainable diets, focusing on the

consumer as the site of action to make more sustainable and healthy choices. This affirmation of consumers as the site of action is evidenced by a consumer first approach, but also takes advantage of complex and distanced food supply chains to sell simplified sustainability messaging. Ultimately, the strategies pursued to continue corporate growth in novel ways highlight the tensions between sustainability and the healthfulness of these products, while companies try to protect these most-profitable ultra-processed foods in their portfolios.

The chapter begins by outlining the three primary ways that companies are engaging with product-portfolio management in attempts to stay relevant. This first section illustrates the empirical findings of the document analysis. First, Big Food firms are developing new products. Product development, including revisions, updates, and discontinuation, has been documented in the health space with reformulation, fortification, and functionalization found by both academics and celebrated by industry (Scrinis 2016; Scrinis and Monteiro 2018; Vlassopoulos et al. 2017). On the sustainability front, reformulation and the development of new products are occurring to include "clean labels", "natural" and organic ingredients. Companies are also working hard to develop products that reach new customers and expand their markets. Second, Big Food is pursuing new brands through mergers and acquisitions (M&A) – with M&A activity hitting record highs in 2016 and 2017 (Best 2018). Finally, investments are occurring through start up accelerators and venture capital funds to spur innovation and meet sustainability challenges. The presented examples are meant to be illustrative of the broader trends going on this sector. Many of the examples come from the largest companies in the sector – including, Nestlé, Unilever, and Danone – as these companies are often able to lead the way on new investments, innovations, and expansions. Appendix E provides a more comprehensive look at how these trends are emerging across all eleven companies.

The second section of the chapter outlines the implications of these many portfolio changes for sustainable diets and food systems more broadly. This second section applies the conceptual framework to the empirical findings and provides analysis on the implications for policy. It illustrates how evolving company product-portfolios can shape sustainability in narrow terms that undermines more progressive interpretations of sustainable diets. This section also illustrates how product-portfolio management reinforces individualized responses to sustainability. Finally,

the chapter shows how product-portfolio changes in the current governance climate that results from key features of the agrifood landscape can provide openings for Big Food to claim legitimacy as a contributor to innovation and sustainability.

6.1 Changing Portfolios

A product-portfolio entails the entire collection of products or services that a company offers (Investopedia 2014). In the context of food and beverage companies, this includes all of the products that they sell, or services they provide (eg. Unilever Food Solutions, or Dollar Shave Club) including those sold under various brand names. Product-portfolio management is tightly entwined with business innovation and new product development. In the current climate, global markets are incredibly fast-paced with competition, consumer preferences, and new technologies changing rapidly. Business success is tied to a company's ability to innovate and manage their product-portfolio strategically, optimizing resources and "balancing" the portfolio offerings (Kang and Montoya 2014; Levandowski et al. 2013). Product-portfolio management entails a variety of decision-making activities to align new product development with overall business strategy. This can include not only new product development, but decisions on revisions, updates, and discontinuation of products that are already commercialized (Cooper et al., 1999; Jugend and da Silva, 2014; Kester et al., 2011). Managing a diverse and global portfolio strategically also entails making these decisions across the company, and across the different regions that it serves. A complex web of political values, strategy, and uncertainty all play a role in the decisions made on product development and portfolio management (Jugend and da Silva 2014).

Before outlining the three ways that companies are pursuing product-portfolio change, the section provides a short overview of the current landscape. This overview contextualizes companies' current portfolio breakdown – key brands, global presence, and unique features – important background needed to understand how they may be motivated to pursue the change strategies detailed below. The outline is done in alphabetical order by company name.

6.1.1 Current Product Portfolios

Associated British Foods (ABF) has one of the most-diverse portfolios of the world's top eleven food and beverage manufacturers. It holds a smaller share of the global packaged food market, and is diversified into sugar production, ingredients and enzymes, milling and bakery, agricultural technology, and non-food retail. ABF characterizes itself as, "a diversified group of businesses which enjoy a high degree of autonomy in the running of their operations" (ABF 2018). Holding a varied portfolio, it still relies heavily on the packaged food industry through its many subsidiaries that feed into the food and beverage sector (Guthrie 2015). Key brands for the company include Patak's Indian foods, Twinings teas, Tate & Lyle sugar, Ovaltine malt drinks, Ryvita crackers, Jordan's cereals, Lea & Perrins, and HP sauces. ABF does have the unique situation of an almost entirely separate business in Primark, which makes up more than half of its total revenues and profits (ABF 2017a). However, this business has its own issues with scrutiny over labour standards in its supply chain and the role of fast fashion in environmental damage (Bain 2018; Dearden 2014). These risks mean that this separate business entity does not necessarily insulate it from risk in the way that other diversified interests might.

The Coca-Cola Company manages to be one of the top food and beverage manufacturers in the world, holding a portfolio entirely made of beverages. The company has attempted to diversify into health and wellness categories, but still has major weaknesses from its dependence on carbonated and sugar-sweetened beverages and image as a major contributor to global obesity (Euromonitor International 2017h). The company has an international presence, with diverse localized portfolios. Key brands include the iconic Coca-Cola, Sprite, Fanta, Dasani Water, Minute Maid juices, Powerade, Simply beverages juice brand, Vitamin Water, Smart Water, Fuze Tea, Odwalla juices, and Honest Tea, to name a few.

Danone's primary business is in dairy, with over 70% of its 2016 packaged food sales in this category. It is also the world's second largest baby food company, comprising over 25% of its 2016 packaged food sales (Euromonitor International 2017b). The company is also a key player in bottled water, and what it describes as "advanced medical nutrition" (Danone International 2018a). Emerging markets are an important geographic region for Danone, making up 58% of its sales and priority markets for corporate business development being Mexico, Indonesia, China,

Russia, the US and Brazil (Euromonitor International 2016a). Danone's mission statement is "bringing health through food and drink to as many people as possible" (Danone International, 2018, 2). The company has also had 30% of its global business certified B Corp and intends to have global B Corp certification. Certified B Corps are "for-profit companies certified by the nonprofit B Lab to meet rigorous standards of social and environmental performance, accountability, and transparency" (B Corporation 2018). Danone North America is the largest certified B Corp in the world, and Danone Canada is the largest "consumer-facing" B Corp in Canada (Danone 2018c). Key brands in the Danone portfolio include Evian water, Activia yogurt, Actimel, Volvic, Yocrunch.

General Mills is present in a wide variety of food and beverage product categories, focused in this sector apart from a recent acquisition in pet food. The company's own website lists organic and natural as one of its key categories, positioning it as an important contributor in this space. Unlike other companies, General Mills does not have as much of an international presence, with most of its brands in North and South American markets. Well-known brands include: Yoplait, Betty Crocker, Annie's Organic, Progresso, Cheerio's, Lucky Charms, Nature Valley, and Pillsbury. The company also owns Muir Glen Organic and Cascadian Farms, companies that sell frozen and canned vegetables.

Kellogg Company has seen very little growth in the past few years with its heavy reliance on breakfast cereals. In 2016, the company had between 40 and 45% of its packaged food sales coming from breakfast cereals, and just under 30% of its packaged food sales coming from savoury snacks. Sweet biscuits and snack bars, and baked foods make up another 16% and 9% respectively (Euromonitor International 2017f). The company has pursued snacking as a category for delivering growth in recent years, with a notable acquisition of Pringles in 2012 (Euromonitor International 2017f). While Kellogg Company is present globally, with sales in 180 countries and manufacturing in 18, it is still quite reliant on the North American market (Euromonitor International 2017f). Some of the key brands in its portfolio include Special K, Rice Crispies, Pop Tarts, Eggo, All Bran, Nutri-Grain, Pringles and Cheez-Its (Kellogg Company n.d.).

The 2015 merger of Kraft and Heinz made the new company, Kraft Heinz, one of the largest food and beverage manufactures in the world. It has a wide variety of processed food categories, and major "billion dollar brands". The largest 2016 category sales were in dairy (through processed cheese products) at 30%, sauces at 22%, and processed meats at just under 15% (Euromonitor International 2017d). The brand's image is intricately linked with processed food, and thus faces challenges in diversifying its offerings (Euromonitor International 2017d). While globally present, particularly with the Heinz brand, its most prominent market is North America. Heavily dependent on top brands, 56% of sales and 79% of the company's growth in 2016 came from just three brands (Kraft, Oscar Meyer and Heinz), with the top ten brands generating 80% of sales (Euromonitor International 2017d). Its key brands include: Kraft, Heinz, Lunchables, Velveeta, Maxwell House, Planters, Oscar Meyer, Jello, CapriSun, and Cracker Barrell (Kraft Heinz 2018).

Mars has the unique feature of being the largest privately-owned food and beverage company in the world, and thus is not required to report on financial details in the same way other companies are. The family has said that they are committed to staying private, and that this gives them the flexibility to pursue things like sustainability (Thompson 2018). The company is primarily a confectionary company, with roughly 90% of its packaged food sales being in this category in 2015 (Euromonitor International 2016b). Some of its major brands include Mars, M&M, Wrigley's, Skittles, Dove. The company also has some sales in rice, pasta and noodles, with the iconic Uncle Ben's brand (Euromonitor 2016). While Mars is present globally, it is dependent on the U.S. market, with the country making up 34% of its global packaged food sales (Euromonitor International 2016b). Together, the U.K. and China made up an additional 21% of its sales in packaged foods (Euromonitor 2016). In recent years the company has made major acquisitions in pet care to diversify from confectionary, even buying a line of veterinary clinics. Mars now owns Royal Canin, Sheba, Waltham, Whiskas, Cesar, Iams, Eukanuba, Pedigree, and Temptations, as well as veterinary clinics, pet GPS trackers, and Wisdom Panel – a pet genetic testing company (MARS Inc. n.d.).

Mondelēz is another company that has a predominantly snack-filled portfolio. It leads this segment of the market with its top packaged food sales coming from confectionary, sweet

biscuits, snack bars, savoury snacks, dairy, and baked goods. The company was only created in 2012 when Kraft Foods Group restructured, retaining its North American operations, while Mondelēz has an international focus (Euromonitor International 2017a). The company has a predictably weak presence in the U.S. market, and in 2016 attempted to buy Hershey to become the world's largest confectionary company, but ultimately, the deal was rejected (Kell 2016; Roumeliotis 2016). Mondelēz has a number of billion dollar "power brands", including Milka, Oreo, Dairy Milk, Cadbury, LU, Trident, Tang and Nabisco (Mondelēz n.d.).

Nestlé is the largest packaged food company in the world, with a diverse portfolio. The company is also the largest baby food maker in the world, with notable brands like Gerber contributing to the category's 20% of total 2016 packaged food sales. It is also a big player in the bottled water industry with Nestlé Pure Life, Poland Spring, Perrier, and San Pellegrino brands. The company has a significant dairy business with Nestlé Carnation, Nido and CoffeeMate. Confectionary is the third largest packaged food category for the company, making up about 18% of its 2016 packaged food sales. Nestlé is an incredibly global company but is still dependent on developed markets, which accounted for 58% of its global sales in 2016. However, it is important to note that this number has fallen from 69% of its total sales in 2010 (Euromonitor International 2017a).

PepsiCo has taken a different approach to change compared with its major competitor the Coca-Cola Company. Unlike Coca-Cola, the company was always more than a beverage giant, being one of the largest savoury snacks companies in the world due to its Frito-Lay arm of the company. In 2006, Indra Nooyi became President and CEO of the company after serving as an executive since 1994. She has shaped the direction of the company, moving it towards healthier options, and diversifying the portfolio through acquisitions. Despite her efforts, 80% of the company's packaged food sales in 2016 still came from savoury snacks. Food makes up about half of PepsiCo's sales, with beverages being the remainder. The company has also pursued vertical integration by buying its two largest bottlers in North America, giving it greater control of its value chain (Euromonitor International 2017e). The company has split its portfolio into three categories. "Good-for-you" contains waters like Aquafina, or its new sparking water brand bubly, hummus brand Sabra, Quaker brand products, juice brands Tropicana and Naked, as well as sports drink Gatorade. The "better for you" category contains lighter versions of snacks like

Smartfood delight, and baked Lays, as well as Pepsi Zero Sugar, and Pure Leaf ready-to-drink teas. Finally, the "fun for you" category contains the majority of the business through savoury snack brands Lays, Cheetos, Ruffles and Doritos, as well as Pepsi, Mountain Dew, Brisk Iced Tea and 7Up. Indra Nooyi has very recently announced that she will leave the company in 2019, and there is positive speculation about the strategic direction it will take with stocks up on the heels of the news (McGrath 2018).

Unilever has been focusing its business in recent years, divesting major parts of its food business across a number of categories, including edible oils, meal replacements, pasta sauces, sweet and savoury snacks, pasta, frozen food, spreads, oils, sauces, and dressings. In 2017, the company divested its spreads business to KKR & Co. for 6.83 billion euro (Buckley 2017). The company's main packaged food offerings are in the ice cream and frozen dessert category (45% of its packaged food sales in 2016), and sauces dressings and condiments, which made up ~23% of its packaged food sales in 2016 (Euromonitor International 2017g). Unilever also has a major presence in personal care, part of the company's efforts to keep its portfolio focused on wellness. The company owns a number of key brands, including Ben and Jerry's, Lipton, Magnum, Hellman's, Breyers, Knorr and Becel. The company has made a clear goal of increasing "sustainable nutrition" offerings, improving the nutritional profile of its portfolio (Unilever 2017).

As evidenced, each company has unique characteristics that make it more or less likely, or able, to contribute food products that may in some way contribute to more sustainable and healthy diets. A summary is provided that shows key products in their portfolios, and based on the work presented above, places companies into one of 5 categories. Low contains companies where very little of the portfolio is made up of ultra-processed food products. Danone's portfolio is almost entirely water, baby food and yogurt (Danone International 2018b). Danone demonstrated that 88% of their volume sold was recommended for daily consumption based on "official public health recommendations" (Danone International 2018b). While not completely free of ultra-processed products, the company has positioned itself in the health space and has stayed away from snack foods or confectionary. On the other end of the spectrum, "high" ratings were given to companies where the vast majority of their sales come from ultra-processed foods. For

example, over 50% of Mondelēz's revenues come from confectionary alone, and the rest of their portfolio is primarily made up of biscuits, sweet and savoury snacks, and baked goods (Euromonitor International 2017c). Company product-portfolios also present unique risks and opportunities. In order to avoid the risks and take advantage of opportunities firms are pursuing a number of activities to change their portfolios, outlined below. Further examples are included in Appendix E.

Table 6.1: Summary of Current Portfolios and Reliance on Ultra-Processed Foods

Company	Current Portfolio Summary	Reliance on Ultra-Processed Foods
Associated British Foods	Packaged foods, enzymes and ingredients, milling, baking, sugar, agricultural technology, fast fashion	Medium-high (indirect)
The Coca-Cola Company	Beverages	High
Danone	Dairy, baby food, water	Low
General Mills	Packaged foods, beverages, pet food	High
Kellogg Company	Breakfast foods, snacks	High
Kraft Heinz	Packaged foods and condiments	High
Mars	Confectionary and pet products	Medium-High
Mondelēz	Packaged foods – primarily snacks and confectionary	High
Nestlé	Baby food, water, coffee, dairy, confectionary	Medium
PepsiCo	Beverages and snacks	High
Unilever	Personal care, frozen desserts, sauces and condiments	Medium-Low

*Reliance determined on proportion of portfolio and sales. Eg. Of General Mills' $17.6 billion in net sales for FY2016 96% of its sales came from the sale of foods considered ultra-processed, while 3% were vegetables, and 1% was other (General Mills 2017, 3).

6.1.2 Product-Portfolio Management: Creating New Products and Reaching New Customers

Roughly 20,000 new food and beverage products are launched annually in the United States as new companies emerge and product-portfolio management efforts lead to new products (USDA 2017). Failure rates of newly launched products are debated, with statistics as high as 70 to 90% cited by some, while others claim a success rate closer to 66% of launches (Stanton 2014). The largest area of growth in new launches between 2011 and 2016 was in snacking (USDA 2017).

Many Big Food companies have made new sustainable and healthy offerings a key feature of their organic growth strategies, and the USDA's data show that ready-to-eat offerings, and non-GMO claims have been growing consistently, while new products using the exact term "natural" have been slowing down (USDA 2017). The trends across new products provide a rich field for inquiry, as many of the new products result from consumer interest, leaving open the question of whether or not they can truly contribute to sustainable diets. Marketing firms and industry research bodies note that three key trends dominate in the development of new categories: health, environmental claims, and premiumisation. However, the lines between the three often overlap, with sustainability claims linked to health claims, and premiumisation often linked to one or both. This intersection between health and environment may actually align with a sustainable diet where sustainability is understood to be more than just environmental sustainability, and the healthiness of the product is just as important.

As part of product-portfolio management, health continues to be a key consideration, with many new products containing health claims, and the health and wellness industry becoming a key feature of Big Food portfolios (Stuckey 2018). Products reformulated with health claims have been the subject of research in the nutrition field, showing that companies use a variety of mechanisms to make products more easily sold as "healthy" (Scrinis 2016). However, less attention has been paid to the environmental claims that these companies are making, beyond research on environmental certifications and labels. Companies are increasingly rolling out new products with claims that cut across both environmental and health domains. Mintel, a market research firm that keeps track of new product launches through its Global New Products Database, notes that natural claims (including no additives/preservatives, organic and GMO-free) were made on 29% of new product launches between September 2016 and August 2017 (Mintel 2017, 4). This figure was up from 17% of launches with natural claims from September 2006 to August 2007 (Mintel 2017). Natural claims cut across both health and sustainability claims, with health often being the bigger consumer focus. Ethical and environmental claims were up even more, going from just 1% in 2006-2007 and rising to 22% of global food and drink product launches in the 2016-2017 year (Mintel 2017).

The overlap and tensions between health and environmental claims is increasingly common, for example, Mondelēz notes that it will be providing consumers with more sustainable offerings, but point to products that are organic versions of heavily processed foods like crackers, or frozen meals (Mondelēz 2018b). Similarly, Kraft Heinz is now offering an 'adult' and 'natural' version of its Lunchables snacks under the Oscar Meyer brand, a plastic tray with processed meats, cheese, and crackers (Kraft Heinz, 2018, 37). PepsiCo noted that innovation in its core is the company's # 2 priority for growth (PepsiCo 2018). This includes the launch of "Simply" Lay's, Cheetos, Tostitos, and Dorito's which are non-GMO verified, contain no artificial colours or flavours, with some flavours being organic as well. The products have a leafy logo that points to how good for the planet and people they are. The nutrition facts for the new Simply Lays, contain the exact same calorie and macronutrient breakdown as regular Lay's, with 10mg less sodium per serving (fritolay.com 2018a, 2018b). The company is also pursuing a wide array of innovations to its current products to create "better for you options", with new flavours of its Smartfood Delight, and Veggie Sunchips.

At the same time, companies are beginning to take sustainability around dietary choice seriously, with a number of companies having more plant-based products in their portfolio or launching new plant-based brands. Unilever launched a new line of plant-based snacks under the brand Growing Roots, which is also a mission-based brand supporting the development of urban farms. Unilever also offers a vegan version of its Hellman's product. This is a particularly interesting case, as the company sued a start-up that offered a vegan mayonnaise spread because of labelling that Unilever felt was misleading consumers (Kowitt 2016). The company that produces, "Just Mayo" ended up changing the packaging as directed by the Food and Drug Administration. Meanwhile, Unilever launched its own vegan spread, and very quickly afterwards acquired Sir Kensington's which offers a premium mayonnaise, and has gone on to create a vegan spread as well (Kowitt 2016; Ramadan 2017).

The final trend that has increasing momentum in product creation is premiumisation. Premiumisation has been around for many years, but Euromonitor International has called the latest, the second wave of premiumisation (Euromonitor International 2018). The first wave of premiumisation occurred from the 1990s until the financial crisis in 2008 and saw consumers

trading up for brands that sat between mass market global brands like Coca-Cola, and luxury brands. The second wave of premiumisation has become more about making personal connections with consumers and their aspirations, with the new demands of social media and consumer confidence still not fully recovered (Euromonitor International 2018). Premiumisation is featured in many 2017-2018 investor relations presentations. Premium products connect with people more personally and are driven by something that makes them stand out. They are at the same time very often differentiated by their health or sustainability claims. Companies are increasingly making this trend a key part of their strategy to reach new customers who are more health conscious and discerning, care about the sustainability of their products, and are looking for craft and novelty in indulgence (Euromonitor International, 2018a). Nestlé discusses premiumisation as one of the 'global megatrends impacting its Creating Shared Value strategy in 2017. The company states,

> [t]here is a growing appetite for premium, authentic experiences and high-end, indulgent products and services. Nutrition is also becoming increasingly personalised, with ranges designed to meet the nutritional needs of infants, seniors, those with medical conditions – even pets (Nestlé, 2018b).

Another example is Unilever launching its own high protein, low calorie version of its Breyer's brand, Breyer's Delight, which was similarly packaged and marketed to Halo Top. Halo Top is a key competitor and source of diminished sales in the US, by providing "healthy" and indulgent ice creams to consumers in "instagrammable" packaging (Daneshkhu 2018; Kollewe 2017). Unilever had been in talks to buy Halo Top earlier in the 2017, but backed away from the deal (Daneshkhu 2018). The trend of premiumisation is also driven by commoditisation and pressure from major retailers and online sellers to drop prices. While premiumisation does not always entail health and sustainability claims, in many cases it is a way of creating premium brands that speak to consumers and thus influences their dietary habits with implications for achieving sustainable diets.

Beyond health, sustainability, and premiumisation driving change in the sector, localization of product development has led to portfolio management considerations that cut across cultures. Many of the Big Food players have noted their push to reach new customers in emerging markets, while many analysts looking at Big Food argue that this is a strategic area for growth.

As a particularly global company, Mondelēz has been pursuing emerging market growth for many years, with Irene Rosenfeld, the now former CEO stating to Fox Business News that, "without a doubt we continue to see the emerging markets as our greatest source of growth. I mean, even though, as I said, they have slowed down somewhat, they're still growing at a considerably higher rate than the developed markets. That continues to be where we put our emphasis in terms of foundational investments…" (Fox Business 2014). Mondelēz has also repeatedly emphasized the correlation between snacking and GDP growth (CNBC, 2017; Fox Business, 2014; Mondelēz, 2018, 5). The company has also targeted India and Vietnam, citing them as opportunity markets and benefitting from sharp growth in Indian confectionary through its Cadbury brand (Euromonitor International 2017a). It has also focused on building the consumption of chocolate in China, working to establish greater recognition of its Milka brand (Euromonitor International 2017a).

Similarly, the Kellogg Company, which has a portfolio high in snacks, has celebrated emerging markets as the place to grow. In its CAGNY presentation, new CEO, Steven A. Cahillane, noted,

> …we have a large long-standing and growing presence in so many other markets including the developing markets and emerging markets that offer the best prospects for long-term growth. I think our emerging markets presence has been somewhat overlooked. Not only are we growing our emerging markets presence organically, but we scaled it up significantly in recent years through acquisitions and joint ventures…Our growth profile has been improved by shifting our emerging markets portfolio beyond cereal and towards snacks, which are growing even faster in these markets (Kellogg Company, 2018, 2).

With snacking a major focus for growth, certain companies are prioritizing this strategy more than others are, tailoring their offerings to emerging markets, to compete with local brands. Baker and Friel name this trend 'glocalization' noting the golden Oreo introduced in China as one such example (Baker and Friel 2016). They also found that many of the offerings with the best growth in these new markets are unhealthy, including soft drinks and baked goods, with the Oreo example being particularly telling as the cookies now make up 40% of Mondelēz sales in China (Baker and Friel 2016). The focus on sales of confectionary and snacks suggest that the strategies of these companies have significant implications for sustainable diets, particularly when the global context of this phenomenon is considered.

Creating new products to keep up with market trends and try to appeal to new customers is something that Big Food companies have always done and will continue to do. However, markets are changing rapidly, with social media and online platforms making smaller brands able to reach large markets faster, competition is fiercer than ever. Whether or not product changes and innovations will have major impacts on the achievement of sustainable diets is uncertain, but this phenomenon suggests that companies are responding more rapidly and intensely to consumer pressure. Knowing this, it seems evident that changing consumer perceptions would be a key site for the battle to create more sustainable diets.

6.1.3 Buying and Selling Brands: Mergers and Acquisitions by Big Food

"Small is winning" is the message presented in one of Nestlé's latest investor relations presentations (Freixe 2017). Laurent Freixe, CEO of the Americas Zone for the company notes that over the 2013 to 2016 period, publicly traded Big Food companies experienced an average share price decline of 2.6%. Conversely, the share price of "small players" increased by an average of 1.2% over the same period (Freixe, 2017, 6). However, Patrice Bula, Nestlé's Executive Vice President of Strategic Business Units, Marketing and Sales, commented that "it is less about 'big food' vs. small brands, than it is about great brands genuinely answering new consumer expectations" (Bula, 2017, 29). This is the context behind one of the most active years in mergers and acquisitions (M&A) in 2017. Just-food reports that M&A was up 17% in 2017, with 306 deals conducted in the packaged food industry, compared to 259 in 2016, 215 in 2015 and 2014, and 162 in 2013 (Best 2018). The data collected by the market research and food news site also showed that many of these deals were in meat and dairy, an interesting trend given the sustainability and welfare focus on these industries (Best 2018). More recently, just-food has reported on this trend noting that many of the smaller "challenger" brands that have been acquired by Big Food have seen sales slow dramatically in the years since (Martino 2018).

One of the biggest deals in dairy was Danone's acquisition of WhiteWave, and sale of its organic dairy, Stonyfield, in the U.S. to make the deal happen. Danone's mission of becoming a world leader in healthy and sustainable food and drinks has driven its acquisitions strategy with Whitewave its biggest acquisition to date. WhiteWave delivers a variety of organic milk and milk alternative products, making Danone a powerful player in this space and contributing to the

company's B Corp goals (Danone 2018c). This move positions Danone to serve a growing plant-based dairy market and earn recognition for its sustainability credentials.

After an attempted take over from Kraft Heinz in the beginning of 2017, Unilever has been focusing its business strategy. It has made acquiring more sustainability and health brands a priority, while at the same time pursuing premiumization, through ice cream and spreads acquisitions. Mondelēz has similarly been focusing on health and premiumisation buying Enjoy Life Foods, a health-focused snacking company in 2015, while Kellogg Company acquired a company focused on simple ingredients, and transparency, adding a clean label bar (RxBar) to its portfolio of breakfast staples (Coyne 2017; Euromonitor International 2017a). These health-focused acquisitions are part of the overall product-portfolio management efforts that can create occasions for these companies to make legitimacy claims as part of the overall movement towards sustainable diets.

Nestlé has made a number of divestments and acquisitions that suggest the company is moving to a more health focused portfolio. Most importantly, the company is currently in the process of selling its confectionary business in the U.S. to Ferrero, who will become the U.S.'s third largest confectionary player after it also acquired Trolli, Brach's and Black Forest candy brands (Rossolillo 2018). Nestlé has also spent the last few years acquiring key health, wellness, and sustainability brands, including Freshly, a direct to consumer food company, Sweet Earth plant-based foods, a number of cold-brew coffee companies, as well as a nutritional health supplements company (Rossolillo 2018). While some fans of the Sweet Earth brand were disappointed in the sale, CEO Kelly Swette was vocal in defending it, noting that the company would continue to operate in its facility and that it would give them access to recently developed technologies, and "to accelerate and intensify their goals and reach a more sustainable future" (Watson 2017a). Speaking to FoodNavigator-USA, the CEO also argued, "I think there's something wrong with a system that thinks it's great for technology companies to invest in companies that want to change the food system but somehow it's not right for big food companies to invest in them. Big Food companies such as Nestlé have to be part of the change, so this deal is a validation" (Watson 2017b). Her remarks highlight a key contradiction of

thinking in the food industry, between the role of Big Food, innovation, and investment, one that will be critically important for the future of sustainable diets.

6.1.4 Investing in Innovation: Corporate Venture Capital and Accelerator Programs

All of the top food and beverage manufacturers have at least one related venture capital fund. These funds are used by the various companies to access innovation happening in smaller companies and start-ups, to invest in the latest trends, and to control competition from smaller brands to the extent they can. Euromonitor International notes that many companies are diverting research and development funds that would traditionally be spent in house to cultivate external start-ups, with many eventually buying these companies, creating more, "agile portfolio management and reduced risk" (Euromonitor International, 2017a, 8). A big part of this is getting ahead of trends, motivated by the types of threats that are driving portfolio change more broadly. Mintel named the science and engineering of food as one of its top food and beverage trends for the year 2018 noting that, "technology is being used to engineer solutions for our stretched global food supply" (Mintel, 2017, 33). However, the venture capital investments are not all about technology, many are decidedly low tech, with companies investing in ancient grains and superfoods. Regardless of the level of technology involved, these investments are often focused on foods that are seen as being healthy or sustainable, again contributing to how consumers view products and what dietary patterns they follow.

Kellogg Company's venture, Eighteen94 Capital, a gesture to the year the Kellogg brothers invented their iconic cereal, Corn Flakes, has invested in mushroom protein, two different companies offering greens powders, and CarGo, a company that provides boxes of snacks for Uber and Lyft drivers to sell in their vehicles (Eighteen94 Capital 2018). Eighteen94 Capital positions itself as an expert in the food and beverage industry willing to help start-ups in a variety of ways from brand help to legal guidance. Interestingly, the webpage simply states that it is "affiliated with a global business that's dedicated to nourishing families around the world" without naming Kellogg but using its purpose statement of nourishing families (Eighteen94 Capital 2018).

The Coca-Cola Company has an internal venture capital fund called Venturing and Emerging Brands (VEB). It also teams up with other third party investors to acquire indirect ownership stakes in emerging brands (VEB at Coke 2017). VEB works with First Beverage group which helps beverage companies "grow and stand out in a dynamic and competitive industry" (First Beverage Group n.d.). Coca-Cola's VEB also invests in L.A. Libations, "a next generation beverage incubator… always on the lookout for the next great beverage brand that satisfies an untapped need of the health engaged consumer" (L.A. Libations 2018). The company calls itself a key innovation partner of VEB with a focus on the "health and wellness customer" (L.A. Libations 2018).

Unilever Ventures is the venture capital and private equity arm of Unilever, founded in 2002. It positions itself as providing access to Unilever's resources, and global operations, quoting John Kearon, CEO and Founder of Brainjuicer, and one of the investment recipients, "Unilever Ventures combine the strategic and financial benefits of a solid venture capital firm with the unique ability to leverage Unilever, helping us to tune our proposition so that we could appeal to large consumer goods companies" (Unilever Ventures 2018). The fund has invested in a wide array of companies from the expected food and beverage companies, to a variety of make-up and skincare start-ups, meal and grocery delivery services, a specialist music agency, location data technology, and augmented reality mobile application that gamifies consumer and brand engagement. Brainjiucer, the aforementioned company, is a marketing and brand consultancy with market research solutions from behavioural science (Unilever Ventures 2018).

Danone's venture capital fund, Danone Manifesto Ventures, is an asset management private equity fund. It emphasizes the company's "mission to bring health through food to as many people as possible" (Danone Manifesto Ventures 2018b). The venture capital firm positions itself as a collaborative investor who partners with companies and entrepreneurs that, "share our vision of a healthy and sustainable future of food" (Danone Manifesto Ventures 2018a). It is evident that the fund is looking to invest in companies that provide innovation and fresh thinking to the company in line with sustainability and health. In this sense, the Danone Manifesto Ventures fund has a very clear vision and mission statement, but as a new fund that started in 2016 it is still not clear how its investments will align with its missions. So far, the fund's major

investments have been in beverages, providing investment to Harmless Harvest coconut water, and Deep Kona Hawaiian deep ocean water (Avery 2017; Caballero 2018; Danone 2018b). Danone Manifesto Ventures has also invested in two other venture capital funds focused on marketing and media and food and beverage innovation (Danone Manifesto Ventures 2018a).

Nestlé is one of the corporate collaborators, along with a number of other companies, on an accelerator program that was founded by RocketSpace and Rabobank (Nestlé 2017b). The TERRA accelerator, now on its second cohort of start-up companies, brings together "industry's most disruptive start-ups and progressive corporations to fuel cross-industry innovation and set a new standard for food and agriculture" (TERRA Accelerator 2018). The collaboration brings together start-ups through, Rocketspace, founded by a technology executive as a space to work with like-minded tech start-ups and to foster innovation. The company has a number of technology accelerator programs and campuses globally (RocketSpace 2018). Rabobank contributes substantial food and agribusiness expertise to the accelerator, which brings together big companies and start-ups allowing them to work together to validate ideas and offer funding and expertise to new entrepreneurs.

The investment occurring through corporate venture capital and accelerator programs is quite often focused on providing healthier and more sustainable options. In some cases, the investments are directly related to meeting future food sustainability needs, and thus these are important activities to track as part of product-portfolio management efforts that can be seen as contributing to sustainable diets.

6.2 Implications for Sustainable Diets

As discussed in Chapter 2, the accepted definition of a sustainable diet is broad and includes many factors from access, to affordability, to cultural acceptability, to biodiversity and safety. Sustainable diets are seen as a holistic approach to sustainability in the food system because they take all of these issues into consideration (IPES-Food 2017b). However, many of the strategies used by Big Food in their product-portfolio management and investments work within a narrow interpretation of what a sustainable and healthy diet includes. This section makes arguments in two sub-sections. First, product-portfolio management efforts that aim to create new products,

acquire companies, and invest in start-ups engage with ideational debates about the nature of sustainability. This sustainability is often broader than just environmental sustainability – unlike sustainable sourcing – including health and social considerations in line with the idea of sustainable diets. However, the visions of sustainability put forward may not align with the more progressive and holistic intentions behind sustainable diets when the term gained increased attention in the 2000s. These narrowed sustainability terms may also obfuscate connections between various aspects of sustainability. Second, Big Food companies are using product-portfolio management to align their portfolios in a way that allows them to make legitimacy claims, drawing on the idea that consumers are the site of action for governance related to sustainable diets, and responses should be individual changes to increase sustainability. Companies are taking advantage of complexity and distance to shape ideational debates through advertising, while framing as legitimate, a consumer first approach that protects profitable ultra-processed foods in their portfolios.

As in previous chapters, the analytical framework presented in Chapter 3 was used as a heuristic for considering the connections between the political and economic characteristics of the current agrifood landscape that influence politics and governance, as well as legitimacy claims of Big Food companies, and debates around sustainable diets. The focus on understanding legitimacy was once again vital to understand how different ideas around what makes a product sustainable gain traction in the marketplace of ideas that consumers are exposed to. How are certain ideas seen as legitimate? And, what do consumers respond to, according to Big Food's own research and investor relations materials? Additionally, the framework was useful to think through how structural and instrumental power in the industry may play a role in determining the types of start-ups that become successful, and the winners and losers of venture capital investment.

In the second part of the analysis, the framework was central to examining the implications of individualization that can result from the current features of the agrifood landscape. Environmental action that depends on individual efforts is part of a particular theoretical position often beneficial to business, but weaker on making effective change (Maniates 2001). The analytical framework also highlights theoretical work done on distance and complexity within the food system that helps to expose how these phenomena make it more challenging for

consumers to truly comprehend the impacts of the products they buy (Princen 2001, 2002). All of this analysis together requires the conceptual framework to see how these different characteristics, present at the same time, open space for business to work to legitimize ultra-processed foods and their role in responding to consumer concerns about their health and environmental benefits.

6.2.1 Sustainability in a Buzzword: Ideational Debates and Sustainable Junk Food

The product-portfolio change strategies outlined above align with a vision of sustainability that is non-threatening to the bottom line of Big Food companies. Here, ideational debates about the nature of sustainability play out on the battleground of corporate marketing and sales. The inherently narrow vision of sustainability leaves out aspects necessary to encourage more sustainable diets and largely ignores linkages in the system. Work to define the sustainability of the food system, and sustainable diets must focus on interconnected nature of environmental issues and consider the multifaceted and linked nature of health, social issues, and environmental issues (IPES-Food 2017b; Mason and Lang 2017). Product-portfolio changes as outlined by Big Food are at the consumer facing stage of new products, new companies and new investments. Sustainability is demonstrated with phrases like organic, non-GMO, and all-natural as evidenced by the growing nature of these claims in new product launches. This buzzword sustainability takes advantage of ideational debates that continue in food and agricultural sustainability, while at the same time taking advantage of consumers not engaged in these nuanced debates to sell more products.

An illustrative example of the fixation on certain terms or certifications to demonstrate sustainability is organic. Organic production contributes to making food production more environmentally sound; however, there are a variety of issues with focusing solely on organic as a means to environmental transformation in the food system. These critiques are outlined extensively elsewhere by scholars pointing out that organic standards are often close to uncertified farming practices in countries with regulated pesticide usage. At the same time, the cost of being certified may be a barrier to some farmers. Scholars also point out that the environmental shift required to make food systems sustainable is not possible by relying on the market alone, and that organics do not challenge structural capitalist relations of the current

world food economy (Allen and Kovach 2000; Raynolds 2000; Guthman 2014). While food companies pursue labels like organic to sell foods, based on consumer demand, they do not engage with these broader issues of organic agriculture. This omission is particularly problematic due to the relatively weak or 'thin' legitimacy of organics when compared with the 'thick' legitimacy of conventional production methods, the science of genetic modification and the acceptance of the food systems that go along with them (de Wit and Iles 2016). In other words, changes to the market or policy can easily cause a shift away from organics, whereas this is incredibly unlikely with convention production. This is demonstrated in a slow move away from organic in some respects, to 'transitional' or, as one market analyst predicts, 'regenerative agriculture' – currently pursued by Danone (Stuckey 2018). These new agricultural models may indeed be environmentally superior to organic, but the constant evolution of terms can also leave consumers confused, and the terms ill-defined leaving room for companies to interpret them as they see fit.

Kashi, a company owned by Kellogg, experienced a backlash between 2011 and 2014, as it was reported that the company's "all natural" and "organic" products contained GMOs and other ingredients non-compliant with the label (Bindley 2012; Strom 2014). The company has recently moved to supporting, "transitional" farmers, who are in the process of moving from conventional production to organic and are certified by Quality Assurance International (Kashi 2018). Cereal boxes provide a detailed explanation, starting with the statistic that less than 1% of U.S. farmland is currently certified organic. This campaign allows Kashi to position itself as leading the way on more farmers transitioning to organic, and removing potential financial barriers to doing so. However, it does not ultimately address the issues of organic highlighted by scholars in the early 2000s and does little to address other environmental issues associated with these products including waste, energy use and packaging.

In addition to the pursuit of sustainability claims on packaging, innovations that are being pursued through acquisitions and investment, are similarly narrowly focused conceptions of sustainability, that often provoke the use of technological silver bullets, while using sustainability narratives about the need to feed a growing population. Many of the innovative companies that are being invested in, have created meat alternatives that are sold to consumers

on websites and promotional materials as solving the issue of overconsumption of meat, or for example, a mushroom protein company that cites the need to feed more people as the impetus for its work (Mintel 2017; MycoTechnology Corporation 2018). Alan Hahn, co-founder and CEO of MycoTechnology, invested in by Eighteen94 Capital, states,

> "We are rapidly approaching a time where we will be unable to support the population with enough protein to sustain life, our discovery and commercialization of PureTaste protein solves the challenges of feeding an exponentially growing population" (MycoTechnology 2017).

With their venture capital funds, Big Food companies are able to make investments in companies that are selling technological narratives about future food production, while continuing to assess how consumers respond to these technologies, without the risk of having their own brand attached. In doing so, they not only work to legitimize these narratives of future overconsumption and scarcity, but at the same time frame technological solutions as the answer. In a few rare cases, Big Food companies may be investing in or buying smaller companies with a more holistic vision of sustainability, but with companies being as large as the Big Food players are, one brand's quest for sustainability does not necessarily mean that the rest of the company will follow suit.

Much of the merger and acquisition activity, as well as the investments through their venture capital funds are less risky ways for companies to move into new spaces and opportunities with less risk to their overall brand recognition. Venture capital funds in the food industry, although relatively new, are also becoming a way that large overextended firms can buy proven and innovation and technologies. These funds are less about profits and more about getting in on the ground before more nimble entrepreneurial companies take off (Rusli 2012). Quoted in the New York Times, Gerald Brady, a managing director at Silicon Valley Bank, notes that "Companies cannot innovate as fast as start-ups; increasingly they realize they have to look outside. We think it's happening a lot more than people recognize or acknowledge" (Rusli 2012). However, in the six years since he made that statement, these trends are increasingly recognized, as more players develop funds of their own. The pursuit of young start-ups through venture capital investments and acquisition, are important ways that Big Food is attempting to hold on to power. Given their material power and resources, there is the potential for them to continue to shape the food industry, by buying up innovation and companies, dictating winners and losers, and dictating

winning ideas and losing ideas. These efforts can enhance help them to frame their own legitimacy as well as enhancing the legitimacy of these ideas and actors. This power and investment in innovation can also provide Big Food companies with perceived legitimacy as they are seen as helping to spur innovation on food sustainability. Firms are also helping to shape the future of sustainable food by deciding what ideas gain prominence.

The health side of sustainable diets is equally fraught with ideational debates. The social determinants of health approach argues that factors such as low-incomes are more important than diet in shaping health outcomes. At the same time, ultra-processed foods have been argued to have significant and expensive impacts for global health. Swinburn et al. (2011) contend that obesity rates are growing more rapidly in low- and middle-income countries (LMICs) than in high-income countries due to the swift change in food environments. These countries face the traditional drivers of obesity from the nutrition transition, and declining physical activity, but at the same time see emerging risk factors that are more geographically unique, including: early-life undernutrition and later-life obesity, nutrition supplementation and food assistance programs, and chronic stress caused by "poverty, unemployment, crime, [and] lack of safety" (Ford et al., 2017 154). At the same time, Stuckler et al. (2012, 1) argue similarly to Monteiro et al. (2013), that the consumption of unhealthy foods continues to grow rapidly in LMICs, and that multinational food companies "are among the leading vectors for the global spread of non-communicable disease risk". This is evidenced by Big Food's engagement in a number of novel approaches, including a barge down the Amazon river and door-to-door sales in some areas of developing countries (Nestlé 2010, 2017a; Scrinis 2016). Nestlé has also highlighted its ability to "driv[e] sales deeper into rural areas for growth" creating half a million outlets in 18 months in its Asia, Oceania, and sub-Saharan Africa (AOA) Zone (Martello, 2017). This included "new models for route-to-market with micro-distributors" (Martello, 2017).

Novel selling tactics are accepted as ways of providing fortified foods to areas that face malnutrition, but more often, it is shown that these programs sell more processed foods, and are linked to growing rates of childhood obesity and overweight (Jacobs and Richtel 2017; Kimura 2013). Researchers have also found that contrary to popular understandings of the spread of these products being linked to urbanization, it is countries with the highest rates of foreign

direct investment and free trade agreements that have seen the fastest growth of unhealthy commodity consumption (Stuckler et al. 2012). These activities highlight efforts of these companies to normalize ultra-processed foods as a part of diets globally, contributing to the nutrition transition, and going after a market that is less saturated.

Companies have been slow to react to health criticisms, with only small improvements being made in the name of health. Coke and Pepsi, the largest sugar-sweetened beverage makers have faced a significant threat from the "war on sugar", given that this category is the number one source of sugar in packaged foods in the majority of countries (Euromonitor International 2017h). Ultra-processed foods as a whole contribute roughly 90% of added sugars to diets in the United States (Steele et al. 2016). The WHO has increasingly called for limiting consumption of sugar in diets, and in September 2016 urged governments to introduce sugar taxes (Euromonitor International 2017h). Companies, including Nestlé, are working hard to innovate, with the launch of a new lower sugar KitKat in 2017, however, the bar had only 4 fewer calories than the one it replaced (Morley 2017). Interestingly, Nestlé defends its slow movement on health improvements, arguing that, "At times, it might seem as if we are not moving fast enough, but we want to get this process right. Good nutrition should always taste good, or consumers will simply buy less-healthy alternatives" (Nestlé, 2018, 20). PepsiCo claims that, "at least 2/3 of our global beverage portfolio volume will have 100 Calories or fewer from added sugars per 12-oz. serving" and that it will, "increase positive nutrition— like whole grains, fruits & vegetables, dairy, protein and hydration— by expanding our portfolio containing one or more of these ingredients" (PepsiCo, 2017, 15). However, these claims are in response to regulatory environments that are beginning to discuss limiting and taxing sugar. A former advertising executive that worked closely with Big Food over decades argued that industry will not be driven to make these changes unless governments force them to, using limits to "level the playing field" (Boseley 2018). Continued debate about the best way to reduce health impacts from processed foods has meant slow progress on this front, while companies begin to turn to environmental sustainability to sell more products. The slow improvements on health represent a critical reason why Big Food companies, despite some progress, still represent a challenge to the achievement of sustainable diets.

Overall, the environmental and health changes that are resulting from product-portfolio management efforts are often reductionist and narrowly focused, often making only marginal improvements, even though it is hard to measure these impacts precisely. These changes are meant to sell to consumers an assurance that they need not worry about the plastic packaging because the product is organic, or that the impacts to rural landscapes are not an issue because the product does not contain GMOs. This narrowly defined sustainability, used to sell products, does little to encourage a more holistic view of consumer diets and their overall sustainability. It is hard to measure exactly how much progress is being made on the sustainability front given the dearth of studies on ultra-processed food products. However, evidence of the health impacts from the continued consumption of these products suggests they are not contributing to health and sustainability in the ways that are needed to transform food systems.

6.2.2 Individualized Responses to Sustainable Diets in a World of Imperfect Information

Global food firms understand the many threats that are inherent in sustainable diets, and the wider trends of increased consumer awareness about health, wellness, and sustainability. Product-portfolio management efforts respond to these threats to continue growth. Highlighted in previous chapters, the pursuit of growth is not surprising, but challenges the notion that these companies can truly contribute to a sustainable and healthy food system when their focus is on reinforcing the place of ultra-processed foods in diets. This section outlines the various ways that these activities serve to protect the growth of these companies by reinforcing ultra-processed foods in product lines and diets and by focusing on a "consumer first" approach that inherently frames consumers as the site of action for governance that leads to more sustainable diets. Efforts to legitimize consumers as a site of action works to reinforce the power of Big Food corporations, while mitigating risk by downloading it onto consumers. Simultaneously, this marketing takes advantage of the narrowly defined sustainability highlighted above, and the complexity and distance in the food system, which makes it hard for consumers to verify outcomes.

There are a variety of reasons that companies are pursuing these strategies to change their portfolios. Significant pressure is coming from consumers using their agency and voting with their dollars by moving away from more traditional packaged foods, and companies are taking

note (LaVito 2017; Moodie 2016; Shemkus 2015; Westervelt 2015). Consumers in industrialized countries are consistently prioritizing a "back-to-basics mind-set", avoiding ingredients associated with ultra-processed foods such as artificial flavours, preservatives, and colours, despite continued purchasing of these foods at levels well above those recommended for health (The Nielsen Company 2016). The Nielsen Company, a market research firm, also notes that the sales of organics, hormone- or antibiotic-free, GMO-free and natural products grew significantly in 2016 (The Nielsen Company 2016). In Canada, citizens surveyed by the Canadian Centre for Food Integrity showed higher concern regarding the cost of food, keeping healthy food affordable, food safety issues, the humane treatment of animals, and climate change (Canadian Centre for Food Integrity 2017).

"The Need for Transformational Dietary Shifts: How to Nudge Consumer Preference towards Healthy and Sustainable Diets," panel at the 2018 World Economic Forum (WEF), emphasized the growing interest in sustainable diets, and attention from business on this topic. The panel participants agreed that "consumers are actually at the beginning of the food value system" and that, "more focus should be placed on them" (WBCSD 2018b). To do so, businesses must "integrate the human dimensions of food – emotion, pleasure, sharing – into what is generally an overly technical discussion on food systems" (WBCSD, FReSH, and EAT Foundation 2018). The participants on the WEF panel (industry representatives and NGOs working with them) agreed that these healthier and more sustainable food choices must be, not only available and affordable, but "aspirational", which speaks to the premiumisation trend happening in this sector and the focus on marketing to sell more foods (WBCSD 2018b). It is evident that business is beginning to see a role for themselves in shifting diets, but that this role is tied to growth, and focuses on the "consumer first".

Consumer backlash against ultra-processed foods is challenging the power of Big Food companies, and reinforcing the need for reactionary measures to mitigate these risks to their business model. Marketing lies at the interface where Big Food firms interact with consumers. The Federal Trade Commission reported that food companies spent US$1.79 billion on advertising to children in 2009 (Federal Trade Commission, 2012). More recently, the *Wall Street Journal* reports that companies in the packaged consumer goods category spent by far the

most on advertising, with nearly one quarter of their overall budgets going to advertising efforts (Moorman 2017). The Leading National Advertisers (LNA) publishes a list of the top 200 advertisers in the United States each year and for 2016 all of the Big Food companies made the list except Associated British Foods (Ad Age 2017). In 2016, the total U.S. expenditures on advertising for the top 10 Big Food companies was US$9.9 billion (Ad Age 2017)[26]. This is a staggering figure considering it was only their U.S. spending on advertising in a single year.

Meanwhile, significant work has been done on examining the impact of food company marketing in relation to health. A particular focus has been on marketing of unhealthy foods to children with many studies finding links between advertising and rates of childhood obesity and overweight (American Psychological Association 2018; Frazier and Harris 2017). In response to criticism of their activities, there has been some movement by companies to self-regulate in certain countries, while the European Union has put in place some restrictions on advertising of foods to children. In Chile, strict regulations have been put in place that include warning signs on products and removing all characters that might appeal to children from packaging (Frazier and Harris 2017; Jacobs 2018). However, there is little work that explores the use of environmental messaging to sell products. Until recently, much of the environmental messaging was by smaller companies, seen as less of a threat, and certainly less of an example to pursue publicly. Environmental messaging has grown significantly in the last ten years, and is predicted to continue growing, with a variety of initiatives in the packaged food sector beginning to focus on this issue (Mintel 2017). There are few regulatory measures in place regarding these environmental messages, and the impact on diets and food sales are still unknown. At the same time, it remains difficult for consumers, governments and non-profits to verify the information that companies put forward due to the complexity and distance in the system, and the private nature of the data related to their claims. It is evident that companies see sustainability messaging as an area for growth, and are pursuing it in the name of selling ultra-processed foods to discerning customers. Company efforts at enticing consumers point to the continued use of consumer sovereignty and the idea that Big Food is responsible for providing options, which can legitimize the idea that individualized behaviour change is a critical part of the path forward.

[26] Author's calculation based on Ad Age data.

Various policy implications emerge from the use of product-portfolio management to bring companies in line with visions of more sustainable diets. One outcome of the fairly weak and fragmented global governance landscape has been a lack of universal pressure on Big Food actors to work towards improvement. The continued prevalence of voluntary mechanisms and labels over regulatory action is a critical factor here. However, in some countries, there have been regulations or the threat of regulations to reduce, for example, sugars, advertising, or trans fats. It is in these countries that companies have been forced to change the way their products are advertised, and the levels of sugar or fat in them. In England, the government created a sugar reduction program with a challenge to industry to reduce sugar 20% by 2020, with 5% cut in the first year (Public Health England 2018). In the first year of reporting, Public Health England found that across industry there had been a 2% reduction, with many categories showing no improvement. However, the soft drinks industry, which was regulated under their Soft Drinks Industry Levy (SDIL) was able to reduce sugar by 11%, showing that regulation did make a big difference in this case (Public Health England 2018).

At the same time, there is relatively little governance pressure on these companies on the issues of environmental regulation. Pockets of isolated pressure do exist on certain issues, for example Nestlé's water-taking activities, or palm oil mobilization by a variety of non-profit campaigns, or the concerted effort of Behind the Brands to encourage Science-Based Targets and more action on climate change (Dauvergne and Lister 2013). However, overall, there is not scrutiny on these companies that looks at their activities in a holistic way, particularly from a consumption perspective. The work of Oxfam's Behind the Brands campaign did try to look at these companies with a wider lens, but again divided their analysis into parts on specific issues and did not consider the consumption or health impacts of these companies. Given the lack of pressure, companies are able to respond to issues as they come up. This has certainly been the trend, with an evolving corporate sustainability landscape that has largely been reactionary.

Companies are promoting a vision of sustainability that is consumer-oriented, providing options and responding to trends in the market in order to stay relevant. General Mills presented to the Consumer Analyst Group of New York in 2018. The company began the presentation noting that changes all around make "consumer first… more relevant than ever" (General Mills, 2018, 7).

This statement is not unique to General Mills as companies take the needs and wants of consumers into consideration. Presenting at the same meeting, Mondelēz also notes the importance of "consumer first" approaches (Mondelēz, 2018, 10). Much of what it is developing, investing in, and buying is geared towards satisfying consumer trends. To do this, companies must understand how to position brands strategically to ensure that consumers know about the social and environmental work associated with it. Nestlé's Creating Shared Value Report from 2015 overviews how the company conducted brand-led workshops to "help brand teams understand how the brands they work with can contribute to Creating Shared Value in a relevant, compelling and motivating way and, in turn, how this narrative can contribute to brand preference and consumer trust" (Nestlé 2016a, 197). These workshops had the goal outcome of allowing brand teams to communicate their brands' contribution to nutrition, environment, and society more effectively, creating action plans to do so (Nestlé, 2016c). Efforts in this respect demonstrate the consumer-oriented focus of sustainability and the task of ensuring that consumers know all the ways that the product they buy has been made sustainable.

The consumer orientation is also part of a strategy to bolster growth, with companies noting that these products will grow better than more traditional products. Nestlé points to the investor benefits of moving to healthier food and beverages in its report,

> Products with a nutrition, health and wellness (NHW) dimension perform better financially and resonate deeply with consumers. Our portfolio means we are well placed to seize this growing and evolving opportunity. Nestlé foods and beverages with an above-average NHW dimension demonstrate growth rates 1.8 times higher than those that are below average and are 1.5 times more profitable (Nestlé, 2018, 15).

Similarly, PepsiCo has made this a goal in its 2025 agenda, that by 2025, its "rate of sales growth of what [it] refer to as [its] Everyday Nutrition products will outpace the rate of sales growth in the balance of [its] product portfolio" (PepsiCo, 2017, 15).

Companies are increasingly looking to provide more transparency and at the same time engage consumers more. Nestlé has done work to "build consumer interest in environmental issues by using smartphone and other mobile technology to go 'beyond the label'" (Nestlé, 2016, 198). The company used QR codes on products linked to mobile-friendly websites that include tips on 'sustainable consumption and product use' (Nestlé, 2016, 198). The company notes that in the

case that a full life cycle assessment has been conducted, it would "provide a summary of the independent scientific information about the product" (Nestlé, 2016, 198). However, as of writing, this is still a strategy used on only a select few of the company's products, which the company wishes to highlight transparency and environmental information around. Thus, it is hard for consumers to validate information when only key products are subject to such transparency initiatives. Nestlé also links this to the increase in sales of the product, in this case its Gold Blend, noting that the campaign helped sell 100 tonnes of the product within eight weeks and raise awareness of the work it was doing, with consumers subsequently surveyed about their reaction towards the brand (Nestlé 2016, 198). A similar campaign was used for borscht in Poland, supplemented with television ads and testimonials from local farmers, where again the company notes the positive impact on sales and market share of the product (Nestlé, 2016, 198).

Marketing is integral to efforts to create new products and promote brands. In the context of product-portfolio management, marketing teams are part of the process from the very beginning of new product development right through to its launch[27]. Having the marketing team present ensures that a "consumer-first" approach remains a constant and the likeliness of product success is enhanced. However, the focus on consumers means that they are ultimately responsible for making changes, choosing the more sustainable product that is on offer, and contributing to more sustainable diets overall. At the same time, many of the efforts to market brands as sustainable take advantage of complexity and distance. First, as seen in the previous section, significant debates continue on the nature of sustainability and health in the food sector. Second, consumers have little power to ensure that the information they are receiving is accurate, or to compare between companies or products.

6.2.3 Policy Implications of Product Portfolio Management for Sustainable Diets

This chapter has considered the sustainable diets policy implications of shifting product portfolios and offerings. It demonstrates how, at the consumer level, companies are quite often connecting their sustainability efforts with improved health and environmental outcomes. Policy

[27] Interview with Big Food company representative.

questions on sustainable diets related to product portfolio management, innovation and investment, again, impact how sustainability is defined, but also how these governance efforts may lead to further legitimacy of ultra-processed foods in diets, as well as, the ability of consumer level changes to create the necessary environmental and health changes to improve diets and the environment.

Analysis in this chapter has demonstrated how product portfolio management efforts, investment, and innovation take up ideational debates about the nature of sustainability. Importantly, in this space, sustainability debates play out in the context of corporate marketing and sales, and consumer perceptions about what makes a product sustainable. The ability to attach consumer-friendly buzzwords is important to company efforts to sell more products to consumers who may have become wary of ultra-processed offerings. Often the nuance and power imbalances within sustainable agriculture debates are lost by the time the message gets to consumers. Consumer messaging is also tied to health, with many consumers perceiving organic or non-GMO products to be healthier options, rather than being primarily concerned with the environmental impacts of those products.

Efforts to change product portfolios to add products deemed sustainable or healthy can play an essential role in mitigating the challenges to Big Food companies' sales. Companies' ability to show the work they are doing to improve products, and their portfolios may help to enhance the overall legitimacy of ultra-processed foods in diets. This has important implications for sustainable diets policy given that a number of influential studies have identified ultra-processed foods as a systemic driver or catalyst of environmental and health challenges in the food system (IPES-Food, 2017b; Swinburn et al. 2019; Willett et al. 2019). If companies continue to claim that a certain percentage of their portfolio is comprised of health, wellness, or sustainability brands, it is working to delegitimize arguments against these products on the basis of their ultra-processed nature.

Finally, policy options for creating more sustainable diets have been mapped out by Bailey and Harper (2015) in a hierarchy of interventions from those that simply inform and empower, to those that more directly incentivize, restrict or discourage consumption of certain foods.

Importantly, the authors point out that, “there is little evidence that information alone can improve diets at the population level” (Bailey and Harper 2015, 20). The variety of policies used is certainly not “mutually exclusive”, with a diversity of policies possible, to build on each other (Bailey and Harper 2015). However, currently, there is little public regulation that effectively discourages or restricts certain food choices. Companies have been involved in efforts to limit regulation that falls on the higher end of this spectrum. Most prominently, companies have actively fought against taxes on sugary beverages (Nestle 2015). However, evidence presented in this chapter has shown that these may be effective. At the same time, information campaigns and changing norms may make consumers more willing to accept more restrictive policy (Wellesly et al. 2015). As this chapter has discussed, a challenge of policy on sustainable diets related to the consumer end, and health in particular, is that there has been so little concerted effort across jurisdictions and issue areas and that much of it remains business-oriented and voluntary.

Conclusion

Big Food companies continue to pursue a variety of strategies aimed at diversifying their product-portfolios and bringing new offerings to consumers. This chapter outlined empirically, the ways that firms are pursuing new products and customers, new businesses, and new investments as part of their efforts to respond to changing preferences and increasing risks to their business. Simultaneously, these various portfolio changes have significant policy implications for attempts to build more sustainable dietary patterns, and more sustainable food systems.

Collectively, the various changes to portfolios use existing ideational debates about the future of sustainability and health in the food system to engage with narrow conceptualizations, focused on buzzwords used to sell products rather than encourage systemic change while at the same time working to legitimize these ideas as part of the solution. Similarly, in their pursuit of new investments, companies are investing in innovation that likewise engages with narrowed buzzwords, and silver bullet discourse that draws on a growing population and a dwindling food supply. These narratives can be powerful when policy makers assess the best approaches to creating more sustainable and healthy food systems and diets. While there are many different

avenues that companies are pursuing to create more sustainable foods, each one, whether it be organic or GMO-free, presents its own challenges and opportunities, but may not represent the type of transformative change that is required in the food system. Big Food's activity and investment in this space helps to enhance their legitimacy claims, by showing them as contributing to innovation and change in the system, despite the problematic nature of products.

Companies are focused on a "consumer first" approach meant to mitigate risks from evolving tastes and increased awareness of health and sustainability issues. This tactic legitimizes consumers as a site of governance, putting the responsibility on them to make better choices as companies offer them. Simultaneously, there is little holistic regulation and governance on the health or environmental marketing claims, or even the activities of these companies. This results in few incentives for companies to drastically improve their performance or products beyond those measures that mitigate risk to their bottom line.

Chapter 7 Conclusion

7.1 Summary of Findings

The aim of this research was to examine three connected questions. First, this research set out to answer an empirical question: What sustainability strategies are Big Food companies pursuing to claim legitimacy? Second, a more theoretical question sought to answer how insights from the literature on the global governance of food and the environment help us understand Big Food companies' choice of sustainability strategies. Finally, this research sought to understand what the policy implications of Big Food sustainability strategies are for achieving sustainable diets. To answer these questions, this work had four objectives. Chapter 2 focused predominantly on objective one, which was to unpack the current discourse on sustainable diets and illustrate the potential impacts for the business of Big Food as makers of ultra-processed foods. This objective was necessary context to answer the first question and required to answer the third question evaluating the policy implications of Big Food's strategies for sustainable diets. Chapter 3 focused on objective two to describe the current global food landscape and its features that influence food and environmental politics. In completing objective two, Chapter 3 provided the analytical framework necessary to answer question two. Chapters 4 through 7 were focused on answering all three questions by fulfilling objectives three and four. First, these chapters examine three sustainability strategies that Big Food pursues as part of their efforts to claim legitimacy. These three sustainability strategies emerged during the analysis as common across the sector and influential for the ways that we may understand sustainable diets. Second, these chapters evaluated the policy implications of the ways these sustainability strategies are articulated in the context of the current global agrifood landscape and sustainable diets discourse environment.

The answers to the questions and fulfilment of objectives throughout the thesis have led to the argument that the sustainability strategies pursued by Big Food companies that align with sustainable diets help them to shape their claims to legitimacy, drawing on key political and economic features of the current agrifood landscape and the sustainable diets debate. In this context, governance for improving diets to make them healthier and more sustainable is incredibly challenging. This setting provides opportunities for these corporations to define sustainability in narrow and specific ways that may be weaker than alternatives, leave out certain

aspects, or obfuscate outcomes of the current food system. The context of current sustainability strategies and the features of the governance landscape also create opportunities for companies protect their growth by reinforcing ultra-processed products in diets, minimizing a variety of risks to their business, and downloading responsibility for change onto others.

Ultimately, the interpretation of sustainable diets through these sustainability strategies warrants a return to the original intention of the concept, as described by the Food and Agriculture Organization of the United Nations (FAO) and Bioversity International in 2010. The initial focus of sustainable diets was to bring attention to issues of consumption to create a food system that delivers better food, to more people, in a more environmentally friendly and equitable way. This attempt at an all-inclusive definition to work towards sustainability, as discussed in Chapter 2, can be interpreted in a variety of ways. A clear and focused definition of sustainable diets is lacking, which along with a fragmented governance landscape including power inequities and polarized ideational debates allows companies to work within this landscape to define sustainability in their own way, and to construct their claims to legitimacy.

The three chapters build on each other to demonstrate the main arguments put forward. In Chapter 4, the empirical focus is on the various ways that corporate actors in the food and beverage manufacturing sector are measuring sustainability in a 'scientized way'. This chapter concentrates on how sustainability is narrowed down to quantifiable data points, as well as how corporations are engaging in research and development, and how this knowledge is transferred. Chapter 5 then shows how this emphasis on measurement has led to attention on supply chains, reinforcing a sustainability disconnected from health or consumption concerns despite attempting to appear holistic. Sustainable sourcing acts as a powerful mechanism for Big Food companies to mitigate risks and enhance their power, putting the onus for change largely onto suppliers. Finally, Chapter 6 demonstrates how corporate actors are working at the consumption phase to utilize narrow sustainability, dependent on farmers and suppliers to sell products to consumers, individualizing responsibility and protecting their growth by responding to changing consumer demands. The following four sections outline the main empirical and theoretical findings and policy implications arising from answering the questions and objectives of this thesis.

7.1.1 Narrowed Sustainability and Obfuscated Connections

Each of the chapters has demonstrated that sustainability is being measured in narrow and specific way, highlighting that not only does what get measured matter, but how it gets measured and against what standard, particularly when power plays a role in determining the outcomes of ideational debates on these issues. A major finding of this work was that sustainability emerges as restricted to one issue at a time, one area at a time, and the linkages between various issues are often erased or minimized in many sustainability strategies of Big Food corporations. This narrowed sustainability was demonstrated empirically throughout Chapters 4-6. Chapter 4 revealed that an emphasis on the 'scientific' and measurable improvements of sustainability does not adequately attend to the interplay between aspects of sustainability. Drawing on the analytical framework, it was shown that distance and complexity in the food system affords companies a unique position, given that they are working with the most knowledge about the full extent, impacts, and activities of their supply chains. In this context, firms are powerful actors that can take advantage of a variety of tools to attempt to shape what sustainability means. At the same time, they require information from other actors throughout their supply chains to report on their activities (Freidberg 2017b).

The use of and attention to metrics and data does not capture the way that environmental issues change over time and geographic space, but also does not capture how water is connected to GHG emissions, or how packaging may be connected to food waste. Simultaneously, the focus on certain metrics of sustainability allows companies to overlook other aspects of sustainability like aesthetics, the inherent value of nature, cultural aspects of human-nature interaction, intergenerational environmental justice, or outcomes for rural economies. Similarly, in Chapter 5, sustainable sourcing is shown to focus on many of the same scientized measurements that emerge in Chapter 4, while ignoring the issue of consumption of products, as well as, questions of whether these foods are the best use of resources. Chapter 6 established the various ways that Big Food companies are using the narrowed sustainability metrics, and private certifications to start to sell products based on their environmental characteristics, while continuing to separate out health concerns, and focus on minimal health improvements through reformulation. In their investments, companies are similarly focused on technological silver bullets that provide a narrow reasoning for and way of achieving sustainability in the food system.

Narrowed sustainability results out of corporate navigation of the food landscape taking advantage of political and economic features demonstrated in the analytical framework. This is one major conclusion of the analysis seeking to answer research question two. Metrics designed to measure sustainability also contribute to corporate attempts to frame their actions as legitimate by reinforcing particular visions of sustainability despite ideational debates fraught with disagreement on the nature of sustainable agriculture and food systems. Chapter 5 demonstrates how the same narrowed sustainability visions are further framed as legitimate as they become part of private standards and corporate commitments that make up a weak and fragmented governance landscape where sourcing is offered up as the solution to a variety of problems. Finally, complex and distanced supply chains make it hard for citizens to verify the outcomes of various sustainability initiatives, making it challenging to understand the various claims made about new or improved products. Uneven power is essential to all of the other features of the agrifood landscape, with the financial resources of corporate actors giving them access to opportunities to shape sustainability, but also the means to use discursive power to shape the conversations being had in governance mechanisms, retail stores, and households.

The policy implications of narrow and specific corporate sustainability in food and agriculture are immense. As discussed throughout, the visions of sustainability put forward have real impacts for how the food system continues to be conceptualized. While ideational debates about the best way forward for sustainable agriculture and food systems continue, corporate visions of continuous improvements to industrial agriculture in North America and improved small-holder yields are framed as legitimate through the work of Big Food. At the same time, this narrowed definition of sustainability continues to shape diets. Corporate actors are using product-portfolio management to change their portfolios in high-income countries to be slightly better for health, and include new environmental claims about their sustainability. Industry advocates for the benefits of processed and packaged foods, claiming that they are safer, have added health benefits through fortification (especially in contexts where food and nutrition are inadequate), and the potential to reduce food waste (Hoffman and Taylor 2005; Kimura 2013; Lawrence 2013; WBCSD, FReSH, and EAT Foundation 2018). On the other hand, scholars cited throughout this thesis question the motives of these companies, and the healthfulness of their

products. Continued studies show the negative health outcomes associated with consumption of these foods including diets higher in sugar, lower in nutrients, and correlated with a number of non-communicable disease (NCDs) (Fardet 2016; Fiolet et al. 2018; Luiten et al. 2016; Louzada et al. 2015; Steele et al. 2016).

7.1.2 Big Food Efforts to Build Legitimacy as Part of the Solution

Corporate actors are aware of consumer perceptions of their activities and products and are working to frame themselves as a legitimate part of the solution to unhealthy and unsustainable food. The use of legitimacy claims is demonstrated in Chapter 3 but has been further demonstrated throughout the chapters. These claims are framed using process legitimacy where corporate actors are recognizing the issues we face, even calling out the need to stay within planetary boundaries and fight extreme inequality (Unilever 2018c). Legitimacy claims are also constructed in the ways that companies are able to shift the conversation to narrowed definitions of sustainability, obfuscating connections among different sustainability challenges. Big Food companies are also engaging in efforts to create source-based legitimacy by partnering with a variety of organizations that may have more perceived legitimacy than corporate actors with a profit-motive. The SDG framework, discussed throughout, offers a pertinent example, used by numerous companies to frame their work as legitimate.

The features of the global governance system for food and the environment also create space in which companies can advance their legitimacy claims. Complexity and distance enhance legitimacy by making it harder to pinpoint the precise drivers of change, and the best levers to produce improvements. Weak and fragmented governance mechanisms enable companies to forum-shop, using a wide variety of sustainable sourcing initiatives and labelling schemes. Weak and fragmented governance has also provided Big Food with the opportunity to attempt to enhance their legitimacy through their coordination activities, shown in Chapter 5. Companies are stepping in to coordinate a messy governance landscape that has become unmanageable. In doing so, they are able to both frame themselves as legitimate, but to also work to legitimize their favoured private governance mechanisms and initiatives. Simultaneously, it is hard to keep track of all the sustainability activities of these actors, with the wide variety of initiatives that they participate in. This also provides opportunities to frame their legitimacy due to their

significant participation in a wide variety of programs, despite little oversight. Finally, uneven power dynamics allow corporate actors to shift discourse, invest in innovation, and collaborate to ensure that others in the sector use similar approaches.

Throughout the thesis, the power of corporate actors has been explored in a variety of ways, and is key to the continued attempts to claim legitimacy and mitigate risks for these corporations. In the use of scientized assessment, companies are able to resist change. Measuring their impacts, and reports on progress allows them to show the improvements they are making, however marginal. It also allows companies to make farmers the site of governance. In sustainable sourcing, much of the responsibility for change is also given to other actors in the supply chain. Meanwhile, risks to supply of vulnerable ingredients are mitigated and sustainability credentials can be used to sell more product. In changing portfolios, companies are speaking to the ideational debates discussed above, and using their discursive power to shape consumer conceptions of sustainability. New products appeal to consumers based on improved health credentials, organic labels, or non-GMO ingredients. Industry has lobbied against taxes used to change consumption, in the name of consumer interests on price, choice, safety, quality and even labelling (Mayes 2014; Nestle 2015). Big Food continues to perpetuate the use of voluntary mechanisms while strategically using their power to try to navigate an evolving landscape. They are afforded an ability to navigate risks with their structural, instrumental and discursive power in a way that smaller companies cannot. The chart introduced in Chapter 3 has been updated to reflect the insights from this thesis as Table 7.1. New insights from the thesis are in italics.

Table 7.1: Power Encouraging Ultra-Processed Foods Revisited

	Structural Power	**Instrumental Power**	**Discursive Power**
Ingredients – Production	*Participation in Field to Market and other agricultural improvement schemes. (Chapter 4)* *Conducting their own agricultural improvement programs, audits etc. (Chapter 4 & 5)* *Engaging with farmers and scientists to push certain seeds etc. for production.* (Chapter 4)	Lobbying to keep prices of key commodities down through subsidies etc. – corn, soy (Freeman 2014; Kammer 2012)	*Issuing statements on the safety of GMO commodities – perpetuating the growth of these crops for their use.*

Sourcing – Ingredients and Refining Ingredients	Grain traders and processors, ingredient makers (often the same people) concentration (Clapp 2018; IPES-Food 2017a; S. Murphy 2008) Increasingly privatized and voluntary regulation – sourcing commitments. (shown in Chapter 5)	Lobbying to limit regulation on labour, environmental standards and to keep private and voluntary governance mechanisms. Lobbying on the definitions for labelling of ingredients – eg. natural and clean labels (Nestle 2015).	*Ingredient companies selling ingredients that can help manufacturers reformulate to make food healthier, keep labels clean, add protein, last longer, taste better etc.* *Technological fixes through ingredients.* *"Keeping a clean label is important. ClearTaste only requires 'Natural Flavor' on your label.* *Eg. MycoTechnology "Solve your bitter problems with ClearTaste ™"* (MycoTechnology Corporation 2018).
Production	Increasingly consolidated and concentrated industry (IPES-Food 2017a) *Funding to venture capital to encourage new innovations (Chapter 6)*	Lobbying for lower corporate taxes (particularly in 2017 in the U.S.) (Center for Responsive Politics 2018)	- *Product development with the intention of creating sustainable, healthy and premium products to respond to consumer demands (Chapter 6)*
Retailing	- Capital concentration: few supermarket chains jointly control large market shares leading to - Buyer-driven supply chains (Burch and Lawrence 2007; IPES-Food 2017a) - Retailer driven food governance through private certification and auditing systems (Fuchs et al. 2016, 305)	Lobbying for/against product standards, labels (Nestle 2015)	- Consumer sovereignty and choice (Princen 2010) - Promotional efforts focused on unhealthy foods (Ravensbergen et al., 2015)
Consumption	- Abundance of ultra-processed foods in built environment - Ultra-processed foods making up 60% of food consumption in developed countries, and growing in LMICs (Monteiro et al., 2013b) - Efforts to reach populations not served by traditional retail outlets (Jacobs and Richtel 2017;	- Lobbying in the name of consumer interests on price, choice, safety, quality - Lobbying for/against dietary guidelines changes (DGAC in U.S., see Freidberg, 2016) - Lobbying against taxes that are meant to change consumption patterns (R. Mason 2016)	- Creating products to fit changing workforce dynamics and a culture and lifestyle of eating on the run, reduced cooking times, snacking etc. (Dixon, Carey, et al. 2014; Dixon, Woodman, et al. 2014; Lang and Heasman 2015; Weis 2007) -*Creating products that address sustainability*

	Mahajan 2016; Nestlé 2010, 2017a)		*concerns, health concerns, while giving consumers premium and personalized experiences (Chapter 6)*
Resistance to Change	- Funding to research in nutrition, health, environment (Kearns, Schmidt, and Glantz 2016; Mozaffarian 2017; Simon 2015).	- Lobbying against regulations that provide better information (eg. GMO labelling, nutrition labelling) (Hemphill and Banerjee 2015; Julia and Hercberg 2016; Lipton 2015; Scrinis and Parker 2016)	- Promoting improvements to products as the source of change needed for nutrition, environment (Scrinis 2016; WBCSD, FReSH, and EAT Foundation 2018)

The policy implications of corporate power and their attempts to frame their work on sustainability as legitimate comes down to the role for corporate actors in future food system sustainability. If they are perceived as legitimate, they are made an integral part of the answer, and thus, their solutions gain momentum and validation. In turn, alternative solutions receive less thought, attention or funding. This is particularly true in a system that favours partnerships and funding from industry, where public funding is increasingly rare. Alternative solutions may experience weaker (or thin) legitimacy to begin with, where policy changes or economy shocks negatively influence them more easily. Thus, the importance of examining the solutions and strategies put forward by Big Food becomes significant. Alternative solutions warrant attention, and it is critical that the perceived legitimacy of corporate sustainability ideas and actors does not lead us to ignore them while potentially legitimizing the visions of corporate sustainability.

7.1.3 Protecting Business

By defining sustainability in narrow ways, corporate actors are able to focus governance on farmers, and consumers, without adequately dealing with the connections between the production of certain ingredients for products that do not serve consumer health and well-being. This focus on certain actors and deflection from ultra-processed products have considerable policy implications. The current governance landscape and sustainable diets debate have allowed companies to pursue strategies that do not threaten the growth of their firms, but instead enhance it by reinforcing the inclusion of ultra-processed foods in their product lines - high-profit foods made from cheap ingredients. Through scientized assessment of sustainability, particularly life cycle assessment, companies are working to make these foods more efficiently, making them slightly more sustainable but also making them even more profitable. These assessments can also help companies in evaluating new products for the most efficient and least costly production

possible while still meeting markers of sustainability or health. Likewise, sustainable sourcing allows companies to ensure that ingredients are sustainable and responsible, focusing on production and not questioning the consumption of the final products as necessary or not.

Strategies explored in this thesis are also incredibly useful for companies in minimizing risks. The science and data that companies collect provides 'objective' ways of reporting on their environmental progress, and external commitments to stakeholders such as governments and retailers. These tools deliver a powerful way for companies to show what they are doing to consumers, and to governments to ensure confidence and avoid regulation. These tools also make the focus on sustainable agriculture justified which in turn can give companies more control over their suppliers. Complexity and distance make this task easier for corporate actors, justifying the focus down their supply chains at other actors and making farmers a site of governance and efforts to improve agriculture. In the same manner, sustainable sourcing minimizes risks of further civil society action as companies are partnered with a wide variety of non-governmental organizations on their initiatives. This private governance is also a way of minimizing risks of government regulation on their environmental initiatives. Working closely with suppliers also gives Big Food companies reduced threats of supply disruptions, particularly with more vulnerable commodities that may be impacted by climate change. The control of suppliers can also result in a downloading of risks onto producers. Consumers who are more concerned about environmental issues, where their food comes from, or labour issues in supply chains are also appeased by labels and pledges around sustainably sourced ingredients. Portfolio changes also benefit from the complexity and distance of supply chains by making it challenging for consumers to truly question where their food comes from and the accuracy of claims. This fact minimizes risks from consumer backlash unless a civil society organization or non-profit calls attention to discrepancies between claims and the conditions on the ground. In order to make these checks and balances possible, costly research is required. Lastly, portfolio changes geared towards sustainability minimize risks that companies will be left behind by a changing market with consumer preferences rapidly shifting and social media creating buzz around new products.

Strategies outlined in this thesis are also used to appeal to consumers in a way that encourages them to buy these products. This is less explicit in the scientized assessment other than in materiality assessments where companies take their customers into account. However, it is evident with sustainable sourcing and portfolio change. Sustainable sourcing acts as a way for companies to improve their brand standing. A good example of this is Nestlé's 100% sustainable cocoa branding on its chocolate bars, with in store displays and attempts to reach consumers with this messaging. Sourcing practices as a strategy to sell more products is still rare, but some companies are capitalizing on this. Finally, as demonstrated in Chapter 6, companies are focused on consumers first. The consumer experience and preferences are a very big source of inspiration for companies on what products to develop. New brands can act as an opportunity for companies to branch out and do something in a different space. Unilever's Growing Roots brand was developed to provide the company with a different type of product to sell, with a new model, and a health and sustainability focus. Portfolio change is a primary way where companies are using sustainability to move their companies forward and sell more product.

As shown in Chapter 6, many companies have also begun to voluntarily reduce certain ingredients, with goals around the amount they will reduce a certain nutrient per calories, or overall goals about the number of grams of sugar that will be reduced (MARS Inc. 2017b; Nestlé 2018b; PepsiCo 2017). This voluntary work has significant policy implications as it allows Big Food companies to show they are contributing to the SDGs in a concrete way and avoid regulation in an area where there is a real threat. These initiatives also allow companies to meet a threshold, set by governments, the WHO or internally, and to then deem those products as healthy or healthier. PepsiCo exemplifies this with a large "Better for you" category, containing products not necessary to healthy diets, but have been health-washed with minimal improvements. These thresholds do not push companies to rethink the foods they are making in a more transformative way, and do not question these products as part of a broader diet. These reformulation efforts are also firmly embedded in a nutritionism perspective by focusing on specific nutrients rather than the overall quality of foods produced and eaten.

7.1.4 Intention vs. Interpretation

As outlined in Chapter 2, sustainable diets offer a way for consumption issues often left out of the conversation to be considered in discussions about the future of food system sustainability. They can also highlight inequities in the global food system around the consumption of meat, and the growing consumption of ultra-processed foods globally. Sustainable diets can further help to bring attention to often-ignored issues in the food system and may result directly from the consumption habits that have become widespread, particularly in high-income countries.

At the same time, numerous drawbacks should give us pause about embracing the concept wholeheartedly as a policy prescription for "fixing the food system". First, a consumption lens has a predisposition to individualizing solutions, and stigmatizing certain citizens despite broader cultural, systemic, or personal issues that may make sustainable eating more challenging for some. Consumption governance in this context has a tendency towards weak solutions that rarely create transformative change, instead requiring citizens to be "better" consumers. Second, the arguments around sustainable eating are not as clear-cut as they may seem. Chapters 2 and 4 both bring attention to the political nature of scientific debates despite their attempts to appear apolitical and value-free. This has led to considerable disagreement over what sustainability means in the context of food, but also concerns wider debates about sustainability. Similarly, there are significant divergences in public health and dietetics over what is considered healthy, and more importantly, literature that warns against the increasing medicalization of eating, stigmatization of obesity and obese bodies, and the limits of approaches to addressing these issues within systems of capitalism (Guthman 2011; Mayes 2014; Wright and Harwood 2012). Within this context, sustainable diets can hand companies a way of responding to these ideas to sell more food and grow their business.

The original intention of sustainable diets, summarized in the Final Report out of the International Scientific Symposium and appearing on page 12 of this thesis, shows that the authors and symposium participants envisioned the term as bringing attention to a more holistic and integrative approach to food system sustainability. Most notably, they intended to bring consideration to both the health of humans and the health of ecosystems. This thesis cannot predict with precision the impacts of corporate sustainability strategies or even the exact shift

required for diets to be deemed more sustainable. Indeed, the vast literatures on these topics are evidence of the complexity and uncertainty around these questions. However, it does demonstrate that the current visions of sustainability put forward by corporate actors and space given to legitimize them through features of the global food governance landscape, are not easily aligned with the various other interpretations of what sustainable food systems and diets entail.

The literature on sustainable diets overwhelmingly tells us that in order for diets to become more sustainable less meat, dairy, eggs, and ultra-processed foods will be required. The biggest challenge to this is likely not Big Food corporations but culture. Changing culture takes time and requires concerted effort by a variety of actors. If dietary change is seen as a necessary part of transforming food systems, but individualizing dietary change is to be avoided, cultural changes will be essential. Big Food could potentially be part of this cultural shift, but it would entail a drastic departure from their current strategies and focus on "putting food back in food" with an emphasis on something other than reformulation and sustainably sourced ingredients.

Undoubtedly, civil society, governments and international governance institutions would need to play a role to shift cultural conversations in a way that avoids stigmatizing and individualizing. Governments can potentially play a significant role in creating spaces for alternatives to ultra-processed foods through a variety of policies and regulations – balancing the power that keeps these foods prevalent, as seen in Table 7.1.

7.2 Summary of Contributions

This study has delivered new empirical insights into the global political economy of food, concentrating on Big Food companies. This work has examined three sustainability strategies of these corporations, to consider the implications for improving the sustainability and healthfulness of diets. Specifically, this work has shown how corporate actors have tied their sustainability strategies to their legitimacy claims and demonstrated the many ways that the two are intimately linked. This thesis established that all of the Big Food companies, regardless of their level of engagement on issues of sustainability, use their work to make legitimacy claims about their role in the food system. It then identified the ways that these legitimacy claims may help companies maintain their future growth by being part of the solution to myriad problems in the food system.

By concentrating on these actors, new empirical insights were discovered at the intersection of health and the environment.

The new empirical insights on the types of sustainability strategies companies are pursing provided in the substantive chapters of this thesis are useful to those studying food governance and environmental governance. This thesis also added theoretical insights, particularly by applying a previously published analytical framework on four key political and economic features of the agrifood landscape to the concept of legitimacy. Using this framework to focus on legitimacy helped to understand how features of the current agrifood landscape open space for actors to make claims about the legitimacy of their role in future food sustainability and to attempt to advance their views of what this sustainability should look like. The research utilized the conceptual framework to explain how the sustainability strategies firms pursue can take advantage of the current features of this agrifood landscape to attempt to enhance their legitimacy in various ways. First, it problematized the use of "scientized" data in sustainability that allows companies to show progress but narrows sustainability and obscures certain challenges in the food system. Second, the work questioned the use of sustainable sourcing, showing how the wide variety of sourcing initiatives creates an opening where corporate actors can use their power to frame their definitions of sustainability as legitimate, and their role in food system security and sustainability as necessary. Finally, an examination of product-portfolio management uncovered how this practice can work to reinforce voluntary governance, subvert a progressive vision of sustainable diets, and focus on consumers as the site of action on sustainable diets.

With empirical insights gained on what Big Food companies are doing, and the use of the analytical framework to explore how these strategies are used in legitimacy claims, further understanding of the implications for policy on sustainable diets were illuminated. This study provides a more comprehensive understanding of the ways that corporate sustainability strategies fail to meet more progressive visions of sustainable diets that have been set out by the FAO, Bioversity International, and scholars such as Mason and Lang (2017). Debates around sustainable diets have largely focused on how to make them a policy priority, and how to measure them and ensure health. As an alternative approach, this work accepted the concept of

sustainable diets as useful but problematized it to understand how major players shaping the food system can use it to their advantage in making legitimacy claims. The core of this work differentiates between the intention of sustainable diets and the interpretation of the concept by a variety of actors, and particularly Big Food. In interpreting it in this way, Big Food further reinforces their growth, while mitigating risks and downloading responsibility onto other actors.

7.3 Future Work

The present study lays the groundwork for further research into a variety of issues. Given the limitations of time and space, a number of other sustainability strategies were not covered in great detail that could add to future analysis in this area. For example, all of the companies have made some sort of commitment to renewable energy, and for some this appears to be a priority area. MARS has been particularly active in this area, using or purchasing renewable energy to cover 100% of their operations in a number of countries and promising investment in new renewable projects (MARS Inc. 2018b). Water management efforts have also gained significant attention, particularly as a focus of a variety of non-governmental organizations and private governance initiatives. On this issue, companies such as Coca-Cola, PepsiCo, Nestlé and Danone have been most active as the biggest users of water resources. Waste reductions, and zero waste to landfill goals are another prevalent area of sustainability work that could not be covered in detail here but appear in most of the Big Food strategies.

Packaging is a particularly interesting area that I was not able to explore thoroughly in this project. Coming into this work, I had a keen interest in the role of these companies in perpetuating plastic pollution, and one could make the argument that this is an issue that could well form a chapter of a thesis related to consumption issues. It is also especially relevant given the increasing attention paid to plastic pollution in the media, as a result of documentaries like Blue Planet II, coverage of whale deaths resulting from plastic bags, and the heart-wrenching photos of sea life interactions with waste products of human lifestyles (France-Presse 2018; Leonard 2018). There has also been increasing pressure on countries to pass legislation, with a number of them enacting bans that will phase out single-use plastics like straws and coffee cups by a certain date (Reuters Staff 2018; Stewart 2018). Companies have also followed suit with IKEA the first to publicly declare that it will phase out single-use plastics by 2020 (Butler 2018).

Some Big Food companies have recently made a number of commitments in this area as well, but when speaking to one interviewee, they noted how this was an area that really needed more work in the sector[28]. In September 2017, Greenpeace conducted a small beach audit in the Philippines, finding that Nestlé and Unilever products were the top two contributors to plastic waste in the area – a majority of which were sachets (Greenpeace International 2017). With growing pressure on companies, a number of them recently made a promise to eliminate unnecessary single-use plastic by 2025 and to ensure that all remaining plastic packaging is reusable, recyclable, or compostable by the same date (Cuff 2018). Companies from this study that have signed on include AB World Foods and Sports Nutrition, Coca-Cola European Partners, Danone, Nestlé, PepsiCo, and Unilever (WRAP UK 2018). Meanwhile, Coca-Cola's broader company has pledged in the U.S. to collect and recycle the equivalent of its packaging by 2030, while also making its bottles with at least 50% recycled content (Nicolaou, Aglionby, and Daneshkhu 2018). The packaging issue is evolving rapidly, but critics still note that many of the promises do not go far enough to tackle the problem that these companies helped to create. This area would prove fruitful for further research on how these goals to legitimize these companies as taking action, but potentially fail to deliver on the plastic waste reductions required.

In Chapter 6 on product-portfolio management, various initiatives were covered exploring the different ways that companies are adapting to a changing market place and mitigating risks. This would be a fruitful area for further research. Of particular interest is the use of venture capital to manage risk, and the changing landscape in terms of innovation in this respect. How is venture capital in the food space different from other venture capital initiatives? How is corporate venture capital evolving in this space? What are the narratives being used to describe corporate venture capital for food sustainability and health innovation? Similarly, further study of the discourse around technological silver bullets and innovations could prove insightful for understanding how companies are using crisis to sell more products.

[28] Interview, Sustainability Consultant, December 2017

On the sustainable sourcing front, further studies regarding the partnerships between non-governmental organizations and industry, and the proliferation of standards and programs would be worthwhile. Along this line, further work on the developments around business and sustainable diets as they unfold will be vital. FReSH has only just begun its work, and I am interested to follow how this initiative shapes the ways that companies are engaging with sustainable diets in the future. Finally, the role of small and medium-sized enterprises could be explored in the context of sustainable diets, which would relate well to the start-up, venture capital and innovation realms as well.

The new Sustainable Food Policy Alliance represents a departure from the way that business has engaged with governments previously. This initiative and the changing relationship between business, civil society, and governments has many potential research questions. Of particular interest would be how this and similar initiatives influence future policy, the legitimacy of corporate actors, and what the results are for food systems on the ground. There is no doubt that these companies will continue to be the subject of scrutiny and their evolving actions and sustainability activities will provide a wide number of research avenues.

7.4 Final Thoughts

Writing in 1982, Murray Bookchin reflected on how many environmental actions, whether it be farming organically, or using solar power, do not by themselves create an ecological society. He goes on,

> Nor do piecemeal steps however well intended, even partially resolve problems that have reached a universal, global and catastrophic character. If anything, partial "solutions" serve merely as cosmetics to conceal the deep seated nature of the ecological crisis. They thereby deflect public attention and theoretical insight from an adequate understanding of the depth and scope of the necessary changes (Bookchin, 1982, p. 3).

This thesis began with the assertion that necessary changes are required to move food systems, and diets towards health and sustainability. It has examined Big Food corporations as major influencers in shaping the way these changes unfold, as they have shaped food systems and diets more broadly. Big Food companies are taking sustainability seriously and have enacted broad sustainability agendas that cover a wide range of issues in order to make legitimacy claims about their role in food security and sustainability. However, by its own omission, industry covers

these issues in narrow ways, separating them out from their whole. In seeing sustainability this way, obfuscation of connections occurs and moving beyond "partial solutions" is nearly impossible.

The original intention of sustainable diets was focused on both fostering consensus and building holistic solutions to global environmental problems. As Big Food companies continue to build strategies that speak more directly to the term, understanding the interpretations and measuring them against this intent remains an important task. The findings that sustainability is narrowed, and growth protected appear to be at odds with this intention, and piecemeal sustainability may very well divert our "attention and theoretical insight from an adequate understanding of depth and scope of necessary changes" required to make food systems truly healthy and sustainable.

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Appendix A Full List of Documents Coded and Consulted

Source	Document Details/ Sources of Information	List
Industry – The top 11 and their Venture Capital Firms	Webpage of industry actor	1. Unilever – 2018 - Driving Transformational Change. URL https://www.unilever.com/sustainable-living/transformational-change/ 2. Unilever – 2018 – Connecting Consumers and Sustainability. URL https://www.unilever.com/sustainable-living/reducing-environmental-impact/sustainable-sourcing/connecting-consumers-and-sustainability/ 3. Unilever – December 20, 2017 - 12 Ways We Made a Difference in 2017 URL https://www.unilever.com/news/news-and-features/Feature-article/2017/12-ways-we-made-a-difference-in-2017.html 4. Unilever – 2018 – Defining Our Material Issues. URL https://www.unilever.com/sustainable-living/our-approach-to-reporting/defining-our-material-issues/index.html 5. Danone – Danone is Incorporating the RISE Tool into its Assessment of Sustainable Agriculture 6. Danone Manifesto Ventures, 2018. Our Investments. 7. 1894 Capital, 2018. 1894 Capital - Home [WWW Document]. URL http://preview.1894capital.com/en_US/home.html (accessed 4.26.18). 8. ABF, 2018. Associated British Foods plc - About us - Our group - Our businesses [WWW Document]. URL https://www.abf.co.uk/about_us/our_group/our_businesses (accessed 4.19.18). 9. First Beverage Group, n.d. About Us [WWW Document]. First Beverage Group. URL http://firstbev.com/about-us/ (accessed 4.26.18). 10. fritolay.com, 2018a. LAY'S® Classic Potato Chips [WWW Document]. URL http://www.fritolay.com/snacks/product-page/lays (accessed 4.26.18). 11. fritolay.com, 2018b. Simply LAY'S® Sea Salted Thick Cut Potato Chips [WWW Document]. URL http://www.fritolay.com/snacks/product-page/simply (accessed 4.26.18). 12. Kashi, 2018. Certified Transitional Initiative - Kashi | Transitional Trade [WWW Document]. Kashi Certif. Transitional. URL https://transitional.kashi.com/en_US/home.html (accessed 5.11.18). 13. Kellogg Company, n.d. Kellogg Company | Our Brand Portfolio [WWW Document]. URL https://www.kelloggcompany.com/en_US/brandportfolio.html (accessed 4.27.18). 14. L.A. Libations, 2018. Who We Are [WWW Document]. URL http://lalibations.com/ (accessed 4.17.18). 15. Mars, n.d. Science at Mars [WWW Document]. Mars Inc. URL http://www.mars.com/global/science-and-innovation/science (accessed 3.9.18). 16. MARS Inc., 2018a. Fish And Seafood Sustainability [WWW Document]. Mars Inc. URL http://www.mars.com/global/sustainable-in-a-generation/our-approach-to-sustainability/raw-materials/fish (accessed 6.20.18). 17. MARS Inc., 2018b. Mars, Incorporated – Improving Climate Change Efforts with Science [WWW Document]. Mars Inc. URL http://www.mars.com/global/sustainable-in-a-generation/healthy-planet/climate-action (accessed 6.19.18). 18. MARS Inc., 2018c. Mars Wind Farms [WWW Document]. Mars Inc. URL http://www.mars.com/global/sustainable-in-a-generation/healthy-planet/climate-action/wind-farms (accessed 6.19.18).

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Appendix B Sample Interview Questions

These questions represent the basis for getting conversations started. Interviews were semi-structured and thus follow-up questions led the conversations in different directions based on the openness of the interviewee, and their role. These questions also differed slightly depending on the role of the interviewee and represent the most commonly asked questions. Questions were left broad and open to not unduly bias the outcomes.

Question 1: Please tell me about your current role and your background that led you there.

Question 2: Can you elaborate on the types of work you have done with food and beverage manufacturers? (for those who did not work directly in Big Food companies)

Question 3: In your opinion, what is the main focus of food and beverage manufacturers right now when it comes to sustainability?

Question 4: Of the work currently going on, what do you see as most promising for meaningful change in food industry sustainability?

Question 5: What do you see as some of the main sustainability challenges that still exist?

Question 6: Are you familiar with the term sustainable diet?

Question 7: Is there discussion of sustainable diets or the impact of dietary choice within the company (or within the companies you work with)?

Question 8: If yes, can you provide insights on how the conversation has unfolded to date? If so, can you elaborate on what the main areas of contention are?

Question 9: What is the role of science in making sustainability decisions?

Question 10: How has sustainability evolved at this company in the last 10 years?

Question 11: Is there anything else you'd like to tell me or clarify from our previous conversation?

Appendix C Example Codes

Codes - First Cycle Coding, Round One

• accountability	• farm workers	• retail
• acquisition	• farmer knowledge and skills	• Roundtable on Responsible Soy
• advertising/marketing	• farm price	• rural development
• agriculture	• farm productivity	• scale
• air pollution	• food safety	• smallholders
• animal welfare	• fortification	• soil
• auditing	• global reporting initiative	• soya
• beyond compliance	• Greenpeace	• stakeholders
• biodiversity	• growth	• state governance
• bonsucro	• human rights	• sugar
• brand sustainability	• IDH – the sustainable trade initiative	• suppliers
• cage-free	• industry affairs	• sustainability goal
• climate /GHGs	• innovation	• sustainability metric
• CDP	• labelling	• sustainability reporting
• carbon pricing	• labour	• Sustainable Agriculture Initiative
• child labour	• land rights	• Sustainable Fishers Partnership
• cocoa	• leadership	• sustainable intensification
• collaboration	• life cycle approach/assessment	• sustainable investing/finance
• complexity	• livelihoods	○ socially responsible investors
• compliance	• local competitors	• sustainable sourcing
• Consumer Goods Forum	• materiality	• traceability
• consumers	• meat	• transparency
• consumer behaviour change	• milk	• transportation and distribution
• consumer knowledge	• monitoring	• United Nations (Global Compact, Private Sector Forum, SDGs, UNGC LEAD)
• consumption	• NGOs	• UTZ
• continuous improvement	• nutrition	• value chain – supply chain
• contributor to solutions	• Oxfam Behind the Brands	• vanilla
• controlling costs	• packaging	• verification
• COP21	• partnership	• waste
• credibility	• plant science	○ food waste
• dairy	• policy	• water
• deforestation	• poultry	• World Economic Forum
• doubling narrative	• poverty alleviation	• yields
• efficiency	• pre-competitive	
• eggs	• priority ingredients	
• emerging markets	• private certification	
• energy	• Proforest	
• expert	• public policy	
• Fairtrade	• quality	
• FAO	• Rainforest Action Network	
• farmers	• Rainforest Alliance	
• farm economics	• research	

Codes - First Cycle Coding, Round Two

New Code	Emerging From (Previous Codes)
commodity/ingredient	cocoa, dairy, eggs, meat, milk, poultry, priority ingredients, soya, sugar, vanilla, value chain – supply chain
issue area	agriculture, air pollution, animal welfare, biodiversity, climate /GHGs, child labour, deforestation, energy, farmers, farm economics, farm workers, farmer knowledge and skills, farm price, farm productivity, food safety, fortification, human rights, labour, land rights, livelihoods, nutrition, packaging, policy, poverty alleviation, plant science, public policy, rural development, smallholders, soil, transportation and distribution, waste, food waste, water
sustainability approach	carbon pricing, continuous improvement, private certification, sustainable intensification, sustainable investing/finance, socially responsible investors, value chain – supply chain sustainability, sustainable sourcing
governance initiative/ MSIs/institution	bonsucro, cage-free, CDP, COP2, Fairtrade, FAO, global reporting initiative, IDH – the sustainable trade initiative, private certification, Roundtable on Responsible Soy, Sustainable Agriculture Initiative, Sustainable Fishers Partnership, United Nations (Global Compact, Private Sector Forum, SDGs, UNGC LEAD), UTZ, World Economic Forum
corporate governance concept	accountability, auditing, monitoring, labelling, partnership, traceability, transparency, verification, quality
corporate strategy	acquisition, advertising/marketing, controlling costs, credibility, emerging markets, growth, industry affairs, leadership, local competitors, partnership, pre-competitive, sustainability report
sustainability claim/ goal	beyond compliance, brand sustainability, compliance, continuous improvement, contributor to solutions, doubling narrative, sustainability goal, yields
industry alliance/group	collaboration, Consumer Goods Forum
consumption	consumers, consumer behaviour change, consumer knowledge, consumption, emerging markets
NGOs	Greenpeace, NGOs, Oxfam Behind the Brands, Proforest, Rainforest Action Network, Rainforest Alliance
sustainability concept	doubling narrative, efficiency, innovation, scale
sustainability metrics	life cycle approach/assessment, materiality, sustainability metric, sustainability reporting, scale, research, quality
actors of interest	farmers, smallholders, retail, stakeholders, state governance, suppliers, experts

Previous Codes and New Codes That Emerged

- science
- values
- sustainable sourcing
- farmers/smallholders
- portfolio
- sustainability metric

Second Cycle Coding

- complexity
- distance
- weak governance
- fragmented governance
- ideational debates
- structural power
- instrumental power
- discursive power
- legitimacy claim
- process legitimacy
- source legitimacy
- outcome legitimacy

Appendix D Materiality Matrix Comparisons (2015-2018)

A checkmark indicates that the issue was clearly listed in the company's material matrix. If the exact words were not in the matrix, the issue that is interpreted to mean the same thing is listed. For example, a number of companies refer to sustainable agriculture, and this is understood to represent their commitment supply chain responsibility.

Company → Material Issue	**Coca-Cola (2016)**	**Danone (2017)**	**General Mills**	**Kellogg**	**Kraft Heinz**	**Mars**	**Mondelēz***	**Nestlé (2017)**	**PepsiCo**	**Unilever**	**Total**
GHG emissions	✓	✓ CC Mitigation and Adaptation	✓	✓	✓	✓	✓	✓	✓	✓	10
Supply chain responsibility	✓	✓	✓+ commodity availability	✓ Sustainable Agriculture	✓	✓ + carbon footprint and labour issues in supply chain, sustainable agriculture, and specific commodities like palm oil, cocoa, supplier diversity, treating suppliers fairly	✓	✓	✓ Agriculture	✓	10
Energy mgmt.	✓	✓	✓	✓ Natural resource conservation, climate change	✓	✓	✓	✓ (Resource efficiency, or natural resource stewardship)	✓	✓	10
Waste	✓	✓ Industrial and food	✓ food	✓ (food)	✓	✓ + product disposal, littered gum	✓	✓	✓	✓	10
Health and safety	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10
Water mgmt.	✓	✓	✓	✓ Natural resource conservation	✓	✓	✓	✓	✓	✓	10
Product safety/ quality	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10
Over-and under nutrition	✓ - Obesity concerns	✓	✓	✓Health and well-being , and hunger relief	✓ Product health and nutrition	✓ Health and nutrition issues	✓	✓	✓ Innovating more nutritious options	✓	10

Company **Material Issue**	**Coca-Cola (2016)**	**Danone (2017)**	**General Mills**	**Kellogg**	**Kraft Heinz**	**Mars**	**Mondelēz***	**Nestlé (2017)**	**PepsiCo**	**Unilever**	**Total**
Product marketing/ Responsible Marketing		✓ + consumer education	✓	✓	✓	✓ to children specifically, product claims		✓ + influence	✓	✓	8
Food and nutrition security		✓ in multiple categories	✓		✓ hunger and food security	✓ Tackling hunger & disease	✓	✓	✓ Innovating more nutritious options	✓	08
Human rights	✓	✓	✓	✓	✓			✓	✓	✓	08
Product packaging	✓	✓ Product eco-design, packaging and circular economy	✓ Packaging footprint		✓	✓ materials and innovation			✓	✓	07
Labour protection	✓	✓	✓	✓ (Human rights)			✓	✓		✓	07
Business ethics/ compliance, and/or values		✓	✓	✓	✓	✓			✓	✓	07
Animal welfare		✓	✓		✓	✓ animal welfare not listed specifically, but responsible pet ownership is		✓		✓	06
Rural development and poverty alleviation		✓ local sourcing and rural development	✓ smallholder farmers			✓ Economic development, community investment linked core business		✓		✓ Livelihoods	05
Transparency		✓	✓	✓	✓					✓	05

Company **Material Issue**	**Coca-Cola (2016)**	**Danone (2017)**	**General Mills**	**Kellogg**	**Kraft Heinz**	**Mars**	**Mondelēz***	**Nestlé (2017)**	**PepsiCo**	**Unilever**	**Total**
Women's empowerment	✓	✓ Women and youth empowerment						✓		✓	04
Community engagement	✓	✓ Community volunteering Local economic contribution and inclusive growth				✓ community investment linked to core business, local sourcing			✓ Community investment and philanthropy		04
Innovation and Technology		✓ Responsible use of innovations and new technologies	✓ Biotechnology (around increased information for consumers)				✓ GMO			✓	04
Product labeling		✓				✓				✓	03
Biodiversity and land use change		✓	✓							✓	03
Customer protection		✓ (in a variety of categories they mention the impact on consumers)	✓ consumer needs				✓				03
Peaceful and inclusive societies		✓ Local economic contribution and inclusive growth		✓Diversity and inclusion						✓	03
Emerging Markets		✓ Global growth expansion				✓ Products meet developing market needs				✓	03
Data security		✓ under business ethics								✓	02
Air pollutants		✓								✓	02

Company Material Issue	Coca-Cola (2016)	Danone (2017)	General Mills	Kellogg	Kraft Heinz	Mars	Mondelēz*	Nestlé (2017)	PepsiCo	Unilever	Total
Responsible management of industrial automation		✓								✓ potentially in their innovation and technology category	02
Taxes										✓	01
Sustainable Consumption										✓	01
Marine Environment										✓	01
Digital Economy										✓	01
Investing in social innovation solutions		✓									01
Partnerships to help achieving the Sustainable Development goals		✓									01
Artificial ingredients					✓						01
Managing allergens						✓					01
Brands incorporating sustainability criteria						✓					01
Compensation		✓								✓	01

Sources: (Danone 2018a; General Mills 2017, 6; Kellogg Company 2017a, 7; Kraft Heinz 2017, 17; Mondelēz 2017a, 43; Nestlé 2016b, 17; PepsiCo 2017, 13; The Coca-Cola Company 2016b; Unilever 2018a)

* Note on Mondelēz: This was a generous interpretation of the company's four listed material issues: 1) Consumer well-being — promote improved health and well-being through portfolio enhancements and community partnerships, 2) Supply security of key agricultural commodities and social challenges in supply chain, 3) Environmental footprint of agriculture and our operations, 4) Safety of our people and products

Associated British Foods does not file Global Reporting Initiative reports, and thus is not required to report on materiality. The company does use Key Performance Indicators (KPIs) which identify the issues that they consider to be most important. The process for assuring these issues is also outlined in its Corporate Responsibility Reporting Guidance 2017. The issues listed do have many overlaps with what is considered material to most companies, however, many of these key performance indicators are more internally focused or pertain to measuring the positive impact of the business, rather than taking note of areas where they may need to improve its external impact beyond environmental sustainability. Instead, the company lists its achievements here under its social impact measures, showing for example, the over 1 million meals they provide to people in need, through a number of different programs that they donate to (pg. 6). Ultimately, this may not be far off of what other companies end up reporting on its material issues, but the process of identifying materiality asks companies to consider its impact more broadly, which may be valuable in creating change.

Appendix E Product-Portfolio Management Examples

Company	New Products and Customers	Mergers, Acquisitions, Divestments	Venture Capital Funds - Investing in Innovation
Associated British Foods	Acquisition of Ilovo – This is aimed at sugar in African Diets - basic nutrition, growth in consumption, building local brands (Weston 2018).	High 5 Sports Nutrition (2017) Acetum Balsamic Vinegars (2017) Dorset Cereals (2014)	**Tate and Lyle Ventures** Our venture capital fund invests in high growth companies in the fields of food science and technology with a specific drive towards products that help consumers stay healthy. **Investments** Allylix - chemicals for flavour, food, pharmaceutical and agricultural markets BioFilm - thin film technology - for healthcare and pharmaceuticals Changing Health - digital health company focused on helping diabetic patients manage their condition through personalised changes in nutrition and exercise Evolve Biosystems - probiotics and prebiotics for infants Fugeia - wheat bran fibre and digestive health Lumora - molecular diagnostics platform that identifies and quantifies specific pathogens rapidly and accurately Nutriati - "innovative plant-based food ingredients" ProLupin - plant-based milk substitute w/ protein from blue sweet lupin
Coca-Cola	Coca-Cola Zero Sugar (accelerated growth globally) Barrilitos Aguas Frescas - flavored, non-carbonated water beverage Coca-Cola Freestyle microchipped refillable cup Building a "whole stills" category	Suja Juice (US) Cluiangwan (China) Ades (Latin America - March 2017) - plant-based beverages - Topo Chico Characteristics of Recent Acquisitions - Latin America and US, small financial input, healthy and nutritious plant-based beverages, potential for global scaling (Euromonitor) Honest Tea - was originally invested through VEB in 2008 and purchased outright in 2011	**Venturing & Emerging Brands (VEB) is a business unit of the Coca-Cola Company.** Our mission is to identify and nurture brands with billion-dollar potential, drive their emotional and commercial value, and serve and ecosystem of diverse stakeholders **Investments** Blue Sky Soda - soda company zero sugar or cane sugar sweetened products. June 2015 Core Power - from the Fairlife brand - high-protein dairy drinks. Partnered with VEB in 2013. Fairlife - ultra-filtered milk with 50% more protein and 50% less of the natural sugars found in milk. - Entered into a partnership with VEB in 2012 Topo Chico - premium sparking mineral water announced in the US (low sugar and no sugar drinks)

Company	New Products and Customers	Mergers, Acquisitions, Divestments	Venture Capital Funds - Investing in Innovation
Danone	Danone claims that 100% of its portfolio is "health-focused" and thus new products are tailored to this goal (Faber, 2018a, 24, 2018b, 3). While the company does not specifically mention that it is pursuing emerging markets. Euromonitor reports that much of the company's growth in the last 5 years been driven by Russia, Brazil, China and the US (Euromonitor International 2017b).	WhiteWave (2017)	At **Danone Manifesto Ventures**, we're here to offer mentorship and support to help amplify your growth. We bring together subject matter specialists, financial experts, and access to Danone's world-class expertise and resources to help companies grow and scale. At Danone Manifesto Ventures, we are on a mission to create a healthy and sustainable future of food. **Investments** Harmless Harvest (2018) - coconut water Cassius (2017) Kona Deep (2017) - hawaiian deep ocean water Yooji (2017) - Organic frozen babyfood Farmer's Fridge (2017) - vending/ connected fridge innovations accel foods (2017) Michel et Augustin (2012) - unconventional premium indulgence
General Mills	Layered granola nut bars - Nature Valley Peak Edition, Nature Valley Soft-Baked Squares, Oui Yogurt, New Flavours of Haagen Dazs, Old El Paso - Gluten Free Kits, Gluten-Free Cheddar Bunny Tails Annie's, Cascadian Farm Organic Strawberry Granola General Mills is targeting China and Brazil for growth (General Mills, 2018, 17). Expanding Haagen Dazs to Australia, Italy, and Emerging Markets - China (General Mills, 2018, 21).	Blue Buffalo (2018) Epic Provisions (2016) Carolina Laticianos (2015) Annie's (2014) Acquisition Focus Areas - Bolt-on Acquisitions in NA and Europe, Adding Scale in Emerging Markets, New Growth Platforms that Leverage our Capabilities (General Mills, 2018, 29) Divestment - Green Giant - FY16 - 5% of Company Sales	**301 Inc.** We aspire to be an indispensable partner integrating a direct equity investment with the skill and capabilities of General Mills. **Investments** Urban Remedy (2018) - plant-based organic food company that delivers meals, bars, snacks etc. Purely Elizabeth (2017) - natural foods company Farmhouse Culture (2017) - locally sourced, raw, organic, sauerkraut and kimchi D's Naturals (2017) - dairy free protein bars Rhythm Superfoods (2017) - natural food brand good culture (2016) - cottage cheese – grass-fed kite hill (2016) - almond milk cheeses, yogurts, cream cheese Tio Gazpacho (2016) - chilled soups - plastic bottle

Company	New Products and Customers	Mergers, Acquisitions, Divestments	Venture Capital Funds - Investing in Innovation
Kellogg Company	Wide variety of new breakfast items and snacks. Specifically focusing on reducing the use of artificial flavours and colours, adding protein, providing plant-based options. In its frozen section, they have created a line of plant-based bowls under the MorningStar Farms brand. (Kellogg Company 2017c) CAGNY Presentation re-iterated its position for growth with long-standing and growing presence in developing and emerging markets – which it states offer the best prospects for growth in the long-term. Has increased its emerging markets business volume 85% since 2012. The company also boasts about its snacks presence as a potential area for growth in these markets (Kellogg Company, 2018, 2)	RXBar (2017) Ritmo Investimentos (2016) Parati Group (2016) - Brazilian biscuits, pasta and powder beverage Mass Food (2015) - Egyptian Cereal Company BiscoMisr (2015) Pringles 2013	**1894 Capital** Our mission is to take your innovative spirit and entrepreneurial passion as far as they can go. Let's see if our vision fits your goals. Then let's work together to see how we can create the ideal conditions for success. We want to be the place where your ideas come to grow. We're affiliated with a global business that's dedicated to nourishing families around the world. That gives us a unique perspective on emerging food brands and what it takes to bring them to market. **Investments** Cargo (2018) MycoTechnology (2017) Bright Greens (2017) Kuli Kuli (2017)
Kraft Heinz	Introduced Devour, Smartmade Remaking iconic brands to make them free of artificial dyes, nitrates etc. Constantly researching, developing and launching products that reflect modern tastes, leading trends and consumer preferences. Committed to improving the nutrition profile of products and providing choices that help consumers feel better about the foods they eat. The company also talks about doing good by stealth with reduced sugars and sodium in products.	Primal Kitchen (2018) (Watrous, 2018) Kraft Heinz is the result of a merger between Kraft and Heinz and to date has not acquired any other companies. However, headlines were made in 2017 with a 143 billion USD attempted takeover of Unilever. Speculation continues on whether or not the company will attempt to acquire another major brand. Warren Buffett stepped down from the board in April 2018, as he had spoken out against hostile bids. One analyst wrote "We believe that Kraft Heinz will lead the industry in consolidation" (Lodge 2018; Olive 2018).	**Springboard Brands** A platform dedicated to nurturing, scaling, and accelerating growth of disruptive brands within the food and beverage space. **Investments/Brands** Boca Devour* a Kraft-developed brand Jello Play Momofuku Korean Sauce **Evolv Ventures (launched October 2018)** "Working with tomorrow's most innovative and disruptive companies in the food industry" – from Evolv Ventures Twitter

Company	New Products and Customers	Mergers, Acquisitions, Divestments	Venture Capital Funds - Investing in Innovation
Mars	Goodness Knows Bar MARS also highlights its reformulation efforts, and efforts to promote portion sizes that are less than 200 calories, moving away from King Size bars. The company has also made it "easier for consumers to share or save for later". It is also the only company to include labels on its products to identify which foods are best "any day" and which are part of a "balanced weekly diet". MARS's attempts to reach new customers are predominantly in its recent acquisitions in European veterinary clinics.	Turin Choclatier (2016) - Mexican chocolates VCA (2017) AniCura Holding AB (2018) Linnaeus Group (2018) OptiGen (2018)	**Companion Fund** We are a team of investors, entrepreneurs, scientists, petcare professionals and passionate pet owners. At Companion Fund, we invest in a better world for pets. Mars started the Companion Fund in 2018, which lists digital health, services, diagnostics, and nutrition as its areas of interest. It is run by Digitalis, a VC fund focused on fundamental new ideas to address complex health problems.
Nestlé	Nestlé's 2018 CAGNY presentation lists new products and innovation as a key driver for growth, focusing on natural, organic, added, protein and snack categories (Presley, 2018, 3, 7, 9; Roger, 2018, 9, 12). Nestlé highlights its growth in emerging markets in a variety of presentations, its emerging market sales were 32% of total sales in 2007 and were 43% of total sales in 2017. The company notes that there is a compelling case for continued growth and penetration into emerging markets (Roger, 2018, 14)	Wamiz (2018) - digital media platform for pet owners Terrafertil (2018) - Latin American company - natural, organic, plant-based foods and snacks Atrium Innovations (2017) - health products - Garden of Life (a plant-based protein brand) Chameleon Cold Brew (2017) Blue Bottle Coffee (2017) Sweet Earth Foods (2017) - plant-based "meats"	Established Nestlé Venture Capital in 2001 - but little information on it now - was meant to invest in food and health innovation Inventages is now a venture capital firm funded by Nestlé with primarily a focus on health technologies

Company	New Products and Customers	Mergers, Acquisitions, Divestments	Venture Capital Funds - Investing in Innovation
Mondelēz	Business strategy is focused on developing and expanding in snacking, particularly in developing markets (Bloomberg 2018). Wants to become the world's largest snack company. Currently has 7.4% market share in this category behind PepsiCo (Wiener-Bronner 2018)	Enjoy Life Foods (2015) failed attempt at acquiring Hershey's in 2017	Launched an "innovation hub" in November 2018 called **SnackFutures**. One element of this innovation hub is focused on venture capital. *SnackFutures* will seek entrepreneurs, suppliers, nutritionists, food and technology engineers and other potential partners to collaborate on opportunities in three key strategic areas: • Well-being snacks and ingredients • Premium snacks and ingredients • Digital platforms and capabilities (Donnelly 2018; Mondelēz 2018c, 2018a)
PepsiCo	Frito Lay Simply Line of Lays, Doritos and Tostitos Veggie Harvest SunChips Off the Eaten Path Hummus and Veggie Chips Drinkfinity - pod drinking system - sold as producing less plastic than traditional drinks - pg. 53 of 2016 report	2016: Acquired Kevita Probiotic Drinks (health) Most of its acquisitions took place in the 2000s - not as focused on sustainability as much as health	In 2017 PepsiCo ran its first Nutrition Greenhouse programme to support start-ups with bright nutrition ideas in Europe. Unilever and PepsiCo are limited partners in Physic Ventures, a venture capital firm designed to help corporate investors build commercial partnerships with portfolio companies. Both Unilever and PepsiCo have installed full-time employees in Physic's downtown San Francisco offices.
Unilever	Growing Roots	**Food and Beverage Acquisitions Only** Betty Ice (2018) - Romanian Ice Cream Producer Tazo (2017) - tea Mae Terra (2017) - Brazilian natural and organic food Weis Frozen Foods (2017) - ice cream and frozen foods in Australia Pukka Herbs (2017) - teas Sir Kensington's (2017) - mayonnaise	**Unilever Ventures and Unilever Foundry** Unilever Ventures is the venture capital and private equity arm of Unilever. We invest in young, promising companies, accelerating growth by providing access to Unilever's global ecosystem, assets and expertise. **Food Investments** • Froosh • Hangyo • SNOG • Sobe • V Water • Gousto • Yummly • revolution foods.