Rethinking Consumption & Production: Systems Design for Sustainable Lifestyles in the Global North

by

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B.S., Finance & International Business, New York University, 2012

Submitted to the Integrated Design and Management Program
in partial fulfillment of the requirements for the degree of

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at the

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ABSTRACT

Climate change & sustainable development are two of the greatest challenges of the 21st century. The dominant narrative for addressing the crisis revolves around technological innovation, which presents an incomplete framing of the problem and produces solutions that only address symptoms and not the root cause of our existential predicament. The purpose of this thesis is to investigate the drivers of unsustainable lifestyles in the Global North by drawing upon scholarship in the field of Sustainable Consumption & Production. The research methods include qualitative secondary research and the application of systems thinking in the social sciences to represent a system of consumption & production.

The output of this research is a framework titled 'The Forces that Shape Consumption & Production', which assists system designers in mapping the relationships and interactions between 4 primary actors – the individual, community, enterprise, and government. A core argument of this paper is that choices made available by a system of consumption & production determine the lifestyles that emerge. The framework is also used to conduct a macro-level analysis of transnational corporations with special attention paid to the United States. The findings reveal six drivers of unsustainable consumption & production that have undermined progress on sustainable development. In order to address these issues, twelve design solutions are identified in 3 intervention categories – practice, cultural, legal – that can be applied to leverage points within the system. Lastly, I propose using the framework as an analytical tool to complement human-centered design methodologies and to create a bridge between academia & industry.

Thesis Supervisor: Nicholas A. Ashford
Title: Professor of Technology & Policy; Director of the Technology & Law Program at MIT

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This thesis marks the end of a 3-year adventure at MIT that has expanded my mind in ways I couldn't have imagined when I stepped foot in the Integrated Design & Management studio on August 21, 2019. I feel extremely lucky to have had access to some of the most inspiring & brilliant teachers in the disciplines of design, engineering, and management. I recognize the unique position that I am in and would like to dedicate this research to those who have a burning desire to build a more sustainable world, but may not know where to begin.

First, I'd like to thank my dear wife who has supported me from Day 1 when I decided to pursue a non-traditional career path that would allow all parts of my identity to breathe. Researching the subject of sustainability leads to moments of existential angst and intense introspection. I am so grateful for your empathy as I navigated the ups & downs of this thesis journey. To my two sets of parents & siblings - you are my heroes. Thank you for inspiring me to pursue my dreams and standing by my side as I "drank from a firehose".

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Chapter 1: Background

1.1 THE CHALLENGE AHEAD

Climate change & sustainable development are two of the greatest challenges of the 21st century. The mandate is clear. According to the United Nations Intergovernmental Panel on Climate Change (IPCC) (2018), our world must achieve net zero greenhouse gas emissions by 2050 in order to prevent global temperatures from rising 1.5°C above pre-industrial level by the end of this century. At that point, the negative impacts on our environment & society will be irreversible. The United Nations Environmental Programme (UNEP) (2021) states that the world will need to halve annual GHG emissions in the next 8 years - an enormous undertaking for society at all levels. In response, governments, industries, communities, and individuals around the world are taking action at varying speeds.

At the COP26 climate summit, 151 countries have submitted climate plans but commitments to deep emission cuts remain weak and ambiguous (Mountford et al., 2021). The UNEP (2021) estimates that these NDCs place the world on track to reach 2.7°C in temperature rise by the end of the century. Tensions exist between countries in the Global South that require funding to leapfrog fossil fuel technologies and countries in the Global North who are largest historical emitters.

After leaving the Paris Agreement in 2017, the United States under President Joe Biden has re-entered the treaty and has committed to a 50-52 percent reduction in GHG pollution from 2005 levels by 2030 (The White House, 2021). Biden's effort has centered on his Build Back Better domestic bill, which seeks to assert US leadership in clean energy technologies and to rebuild America's decade old infrastructure. The bill has unfortunately faced significant opposition to passage in congress and the outcome will determine United State's climate credibility on the global stage.

By the end of 2021, more than 2,200 companies covering 70 countries and 15 industries have made commitments to science-based targets to reach net-zero (SBTi, 2022). These commitments are

voluntary and there is no authority that holds corporations legally accountable to their decarbonization plans. Institutional capital is leading the ESG movement and urging corporations to reimagine capitalism (Sorkin & Merced, 2022), yet both remain incentivized to make decisions that prioritize short-term quarterly performance and profit maximization. Private capital is pouring into climate technology in support of a renewable energy transition that will generate outsized financial return (The Economist, 2021).

Communities are mobilizing to demand change from government and industry. Long-time grassroots organizations such as Greenpeace and the Sierra Club continue to raise awareness of environmental issues in the public arena. A new generation of activist organizations such as Extinction Rebellion and Sunrise Movement are aggressively pushing for political action on climate change.

Individuals are making lifestyle changes after COVID-19 with some returning to pre-pandemic behaviors & norms and others charting a path forward to new ways of living (Echegaray et al., 2021). While consumers report they are concerned about the environment, they often fail to follow through on green purchases – also known as the attitude-behavior gap (Young et al., 2010). Climate anxiety is on the rise due to an uncertain future (Pihkala, 2020) and millions of Americans are leaving their jobs in the Great Resignation in search of fair working conditions (Parker & Horowitz, 2022) .

In these turbulent times, the dominant narrative for addressing climate change that is circulated by government institutions and industry leaders is climate salvation by technological innovation brought about by stakeholder capitalism. A major issue with this narrative is that it presents an incomplete framing of the problem and therefore, proposed solutions will only address symptoms and not the root cause of our existential predicament. Technology is essential but it only buys time so we can address the underlying drivers of greenhouse emissions & material waste - consumption and its associated production.

The elephants in the room are the unsustainable lifestyles of the affluent living in the Global North (Akenji et al., 2021). These lifestyles have emerged from a system of consumption & production

constructed for the ideological pursuit of economic growth. In order to meet the targets of the Paris Agreement, countries must reduce aggregate production-consumption levels associated with energy & material use (Alfredsson et al., 2018). The radical changes needed for achieving sustainable development require a mindset shift – one that I hope this thesis can facilitate.

1.2 RESEARCH AIMS

A significant portion of this research draws upon scholarship in the field of Sustainable Consumption & Production (SCP). 30 years have passed since the 1992 Earth Day Summit in Rio de Janeiro and SCP has matured as two distinct research fields (Cohen, 2019). Sustainable production has focused on cleaner production, industrial ecology, and ecological design pertaining to industrial sectors. Sustainable consumption has focused on the redesign of economic systems, institutions, infrastructure, culture, lifestyles, and forms of social organization (Bengtsson et al., 2018). A review of the current literature on SCP reveals specific research gaps that this paper seeks to address.

Firstly, most SCP research is positioned either in the realm of consumption or production even though the issues are systemic and need to be addressed in tandem. This challenge is due to the different disciplinary & epistemic foundations of consumption and production. There is a need to strengthen the conceptual foundation at the intersection of SCP so that insights can be practically brought to the business environment (Roy & Singh, 2017). Second, SCP requires sustainability-oriented innovation, which deals with a design duality challenge where one must simultaneously hold the interest of humans and the greater society in mind. There is a need for a systems-informed design thinking methodology that can support the orchestration of innovations at disparate scales and time horizons (Jay et al., 2015). Third, relational and structural power are largely unexamined in SCP (Anantharaman, 2018; Fuchs et al., 2016). Inequality in these dimensions is linked to unsustainable systems of consumption and production (Mathai

et al., 2021). There is a need to study and act on the behavioral characteristics and the interaction dynamics of stakeholders in such systems so that interventions may be applied (Wang et al., 2019).

Thus, the following research objectives guide the development of this thesis:

1. Understand the factors that shape lifestyle by examining the individual & the system of consumption & production where an individual's behavior is embedded
2. Understand the influence producers have over consumption patterns
3. Identify design interventions that can transition systems of consumption & production towards sustainability

Chapter 2 reviews the literature to provide a conceptual foundation in systems thinking for the social sciences, a history of consumer society, and an overview of expert viewpoints that drive current research in the sustainability field. Chapter 3 introduces the 'Forces that Shape Consumption & Production' framework that was produced from this research and explains key concepts for its application. Chapter 4 applies the framework to analyze the outsized influence of transnational corporations over unsustainable consumption in the Global North and discusses twelve system design interventions that can change these patterns. Chapter 5 concludes by summarizing the contributions of this research and offering a call to action.

1.3 SCOPE & METHODOLOGY

The research scope is concerned with the issue of overconsumption and unsustainable lifestyles in the Global North. I pay special attention to the actors that influence consumer society in the United States and the impact of commodity goods & services on the environment & human well-being.

The first research methodology of this thesis is secondary qualitative research in disciplinary journals, textbooks, government agencies, researcher networks, policy think tanks, non-profits, and reputable news outlets. Sources include the following:

- Journal of Cleaner Production
- Journal of Pollution Prevention
- Journal of Ecological Economics
- Journal of Industrial Ecology
- Journal of Environmental Studies and Sciences
- Journal of Technology Forecasting & Social Change
- California Management Review
- Annual Review of Sociology
- Sustainability Open-Access Journal
- Global Environmental Change Open-Access Journal
- Sustainable Consumption Research and Action Initiative
- Tellus Institute for a Great Transition
- Technology, Globalization, and Sustainable Development
- The Oxford Handbook on the History of Consumption
- Handbook of Research on Sustainable Consumption

The second research methodology involves the application of systems thinking & system engineering methodologies to build a cohesive framework that illustrates the relationship between lifestyles and systems of consumption & production.

Chapter 2: Literature Review

2.1 SYSTEMS THINKING FOR CONSUMPTION & PRODUCTION

In this section, I analyze the general definitions of 'consumption' and 'production' and extend their semantics by embedding the terms within the societal context.

According to the Oxford English Dictionary, consumption is defined as "the action or fact of destroying or being destroyed; destruction". Even though destruction is a consequential word, human-beings may not consciously associate their consumption behavior with these negative connotations. Instead, we think of consumption in terms of everyday activities such as eating food, shopping for goods & services, engaging in leisurely activities, socializing in groups, traveling to new destinations, creating new experiences, and learning to achieve a fulfilling life.

Production on the other hand is defined as "the action of making or manufacturing from components or raw materials, or the process of being manufactured". While the meaning of production here is limited to the physical world with a tangible material output, production can also exist in the abstract with an intangible output such as knowledge, culture, and emotion.

There are three important qualities that must be considered when examining consumption and production. Firstly, there is a dual nature to consumption & production as one cannot exist without the other. Consumption without production is not possible. Production without consumption is waste. By itself, production is an act of consumption. The two are mutually reinforced in a cycle of creation and destruction. Secondly, this cycle produces benefits as well as costs. The question of who receives the benefit and who absorbs the cost is fundamental to seeing a complete picture of consumption and production. Third, consumption and production exist within a greater system and not in a vacuum. A system is "an interconnected set of elements that is coherently organized in a way that achieves something" (Meadows, 2008, p. 11).

Systems thinking is a useful tool for understanding the phenomenon of consumption & production. General systems theory emerged from the scientific disciplines in the mid-20th century and since then, system thinking concepts have been applied to multidisciplinary fields to understand complexity (Boss et al., 1993). In the applied sciences, Systems Engineering (SE) emerged in the 1940s as a discipline for the design, creation, and operation of technical systems (Camelia & Ferris, 2016). Although SE was created to design cyber physical systems such as automobiles, communication networks, and space shuttles, it can also be used to analyze systems of consumption & production.

In this paper, I use the following terminology and definitions to represent a system of consumption and production (Crawley et al., 2015):

- Systems are comprised of entities that have form & function. Entities are systems on their own.
- Form is the physical or informational embodiment of an entity. Functions are the actions for which an entity exists such as activities, operations, or transformations.
- Relationships among entities create the structure of a system. These can be formal, informal, or functional.
- Interactions among entities produce a new function for the system called emergence, whose functionality is greater than the sum of its parts.

When applied to our living world and built environment, systems & entities can be biological organisms or non-living objects. Biological systems and entities include human-beings, animals, plants, and natural ecosystems. Non-living systems and entities include material goods, infrastructure, networks, and organizations. The delineation between a system and entity depends on the subject of interest. The art in systems thinking lies in setting boundaries and determining the appropriate level of abstraction needed for insightful analysis.

This paper is primarily concerned with systems of consumption & production and investigates their relationship with sustainability. The conceptual context from the discipline of system thinking and

SE provides a foundation for understanding the Forces that Shape Consumption & Production framework in Chapter 3.

2.2 AN OVERVIEW OF ECONOMIC HISTORY

The study of systems of consumption & production has existed since ancient times across empires in Europe, China, India, and the Middle East. Today, we know this field of study as economics, which was formalized during the Enlightenment. Classical economic growth theory emerged from Adam Smith's 1776 treatise The Wealth of Nations. His pioneering ideas on a virtuous cycle of economic growth driven by the pursuit of self-interest, the division of labor, rising productivity & incomes, free markets, and a detached role for government laid the foundation for the modern economy (Ashford & Hall, 2019).

In the 20th century, Neoclassical economics emerged as the mainstream school of thought and is characterized by theories of utility maximization, rational choice, and efficient markets. Neoclassical economists have wielded significant influence over the intellectual landscape and shaped government policies that would propel the United States into a global superpower after World War II (Barry, 2020).

Critics of Neoclassical economics have long argued that it ignores the realities of human nature and the behavioral, sociological, political, and environmental dimensions of society. Grouped together, these alternative theoretical approaches to economics which incorporate natural and social science perspectives are called Heterodox economics (Røpke, 2020).

There are two attributes of today's economy that are regularly expounded to the general public - GDP and economic growth. Economists developed GDP & GNP in the 1940s in order to better support economic planning and decision-making (Ashford & Hall, 2019). Economic growth became a national policy objective in the US after World War II and is now promoted by nearly all countries in the world (Victor & Jackson, 2015). These two attributes are often discussed as one concept, GDP growth, which

serves as the primary measure of performance and success for national leaders at the most consequential levels of society.

Finally, any meaningful discussion on the economy cannot take place without acknowledging the dominant paradigm of capitalism and its role in wealth creation over the past centuries. Capitalism is based on the idea of private ownership of the means of production. A key innovation of capitalism was the reinvestment of wealth - in other words, capital - into expanded production, which leads to rising income that can be spent in the economy (Higgs, 2014). This demand for goods and services can lead to more production, resulting in a seemingly perpetual cycle of growth and further accumulation of wealth. Thus, it's no coincidence that the rise of capitalism created the conditions for the rise of consumer society.

2.3 CONSUMER SOCIETY: PAST, PRESENT, FUTURE

Consumer society is defined as "a society in which people often buy new goods, especially goods that they do not need, and in which a high value is placed on owning many things" (Oxford). Americans are most commonly associated with consumerism, but the seeds of consumer society were planted in Great Britain in the late 18th century (McKendrick & Plumb, 2018). The industrial revolution enabled the mass production of inexpensive goods that were previously limited to the wealthy elite. Producers realized that wants and needs could be extended beyond basic subsistence and experimented with novel marketing techniques to reach members of the urban middle class. These early consumers were able to indulge in the luxuries of furnishing, tea, apparel, household items, children's toys, and more (Stearns, 2001).

In the Theory of the Leisure Class, Thorstein Veblen (1899) coined the term 'conspicuous consumption', which attributed the public display of goods & leisure activities to people's desire for social membership and status. While the majority of households in Western Europe remained poor and were unlikely to participate in consumer society, this period foreshadowed how individuals would define their

goals in daily life around aspirational desires (Stearns, 2001). If England produced a prototype of consumer society, then America in the 20th century scaled this prototype into a thriving regime.

American consumerism did not appear by chance. It was instigated and systematically constructed by powerful forces in government and industry in the 1920s. A central figure during this period was Edward Bernays, the nephew of Sigmund Freud. His ideas on the deliberate manipulation of public opinion and methods for converting hidden desires into everyday practice helped launch the public relations and mass advertising industries (Bernays, 1928). The term 'consumer' is widely used today, but few realize it was popularized during this time by producer associations and interest groups running campaigns to generate demand for domestic goods (Higgs, 2014).

After World War II, the United States federal government needed a way to achieve maximum employment and to improve standards of living. Economic growth was seen as the best path forward and the subsequent rollout of policies in key sectors - housing, transportation, agriculture, energy, finance - created the structure that gave rise to the hallmarks of American lifestyles (Brown & Vergragt, 2016). Large home construction, automobile ownership, meat-rich diets, fossil fuel addiction, and credit-fueled consumption can be traced back to zoning laws, the construction of highways, agricultural & energy subsidies, and financial deregulation (Cohen et al., 2010). From 1950 to 2000, consumer expenditure on non-necessities (food, housing, apparel) increased from approximately 32% to 50% as a share of total expenditure (Chao & Utgoff, 2006).

The combination of producer generated demand and industrial policy produced a massive cultural shift where "consumerism and suburban lifestyle became conflated with such fundamental aspirations as wellbeing, freedom, and democracy" (Brown & Vergragt, 2016, p. 310). Consumer culture implies that the individual operating in such a society has made the switch from consuming for utility to consuming for meaning. There is no single definition of 'consumer culture' but it can be conceptualized as the fabric

of human experience manifested in everyday interactions where individuals & groups derive meaning from commercially produced artifacts & symbols (Arnould & Thompson, 2005).

Consumerism was not without its critics and social movements have formed to fight against injustice within consumer society and society as a whole. These movements have fought for issues such as worker welfare, gender equality in the workplace, consumer rights, ethics and fair trade (Hilton, 2012). The 1960s marked the beginnings of the environmental movement that brought focus to the harmful effects of consumer society served by mass consumption & production. In the decades that followed, four major environmental concerns emerged - resource depletion, toxic pollution, biodiversity loss, and climate change (Ashford & Hall, 2019, p.106). Today, the United States remains the most potent consumer society in the world, but this title has come with enormous costs and ripple effects.

The Ecological Footprint which measures the amount of biological capacity from the planet required to support human activity, shows that since 2000, the United States has consumed more than 5 earths worth of resources each year. Neoliberalism and globalization have exported the American model of consumer society to other countries who have adopted it within their cultural context. The outsourcing of production to developing countries who prioritize economic development over the environment has led to toxic pollution worldwide. The effects of pollution are felt most acutely by the poor and vulnerable, resulting in 9 million premature deaths every year. The Living Planet Index which tracks the abundance of biodiversity shows an average 68% decline in wildlife populations between 1960 and 2016 (*Living Planet Report 2020 - Bending the Curve of Biodiversity Loss*, 2020).

The negative effects of consumer society are also felt on an individual level. Studies have shown that materialism leads to lower levels of mental and physical well-being (Bauer et al., 2012). Compounded with the environmental and social costs of consumption, the future viability of consumer society is certainly in question. Scholars have begun to speculate on a potential transition to a post-consumer society (Brown et al., 2017). In looking ahead to 2050, experts have observed 3 major

challenges that are likely to emerge (Mao et al., 2019). These include rapid changes in infrastructure and norms due to technological disruption, more living constraints due to ecological pressures, and a widening gap between the aspirations of individuals and the reality of the expected future in an unequal world.

Consumer society has reached a pivotal moment in human history where it has outlived its purpose. If consumer society was systematically constructed, it could be systematically dismantled. "Our understanding of how people consume has always reflected our views about how they ought to live" (Trentmann, 2012, p. 1). These views are where we turn to next.

2.4 THE DICHOTOMY OF SUSTAINABILITY AND GROWTH

In setting the stage for present day discussions on sustainability, we first look at three important nuances of the subject.

First, sustainability is a crisis concept that emerged from humans responding to environmental and social inequality issues during the Industrial Revolution. In 1833, William Foster Lloyd introduced the concept of the Tragedy of the Commons, where humans acting out of self-interest exploit a pool of common resources until it is ruined despite knowing the long-term consequences of their action (Hardin, 1968). This behavior very accurately describes the way humans behave today in the face of climate change. Second, sustainability is not politically innocent. It is tied to "larger political battles over empire, markets, and nations" (Chappells & Trentmann, 2015, p. 53). The conservation of resources in a particular region could be realized by drawing upon that of another. This theme continues to be true in today's geopolitical relationships. Third, the global discourse on sustainability is driven by developed countries in the Global North even though developing countries in the Global South are most affected by the consequences of unsustainable consumption & production. Power is crucial to shaping the narrative and agenda, and this unequal balance should always be acknowledged and addressed in any decision-making room on issues related to sustainability (Anantharaman, 2018).

The dilemma of growth and resource constraints has been analyzed by economists, scientists, and environmentalists throughout history. In 1972, Limits to Growth, a publication by MIT scientists who modeled future scenarios of economic development, raised the issue of ecological limits and societal collapse from the overuse of natural resources. Five years later, the UN-assembled Brundtland Commission released Our Common Future, which articulated the first widely accepted definition of sustainable development - "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Ashford & Hall, 2019, p. 135; Doran, 2021).

The 1992 UN Conference on Environment and Development in Rio de Janeiro officially recognized unsustainable patterns of consumption and production as major causes of global environmental deterioration with industrialized countries as the primary culprit (Cohen, 2019). Two years later, the Oslo Symposium came up with a working definition for sustainable consumption & production (SCP). SCP refers to "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations".

The initiatives in the following decades that attempted to make SCP a priority never received proper attention from governments as calls for action went against prevailing norms in economic policy. It wasn't until 2012 that a 10-year framework to support SCP initiatives was adopted by the 2012 UN Conference on Sustainable Development. In 2015, the UN incorporated SCP into Sustainable Development Goal 12, "Ensure sustainable consumption and production patterns", but the targets have not been translated into transformative action (Gasper et al., 2019).

Another influential scientific report, Planetary Boundaries, in 2009 articulates a framework for understanding ecological limits through nine critical Earth-system processes and their estimated thresholds. Scientists argue that human activity beyond these thresholds would cause changes in the

planet that lead to societal collapse and call for a rapid reduction down to a safe operating space. In 2015, the report was updated and revealed that humans have already exceeded 4 boundaries - climate change, biodiversity, land-system change, and biogeochemical flows (Steffen et al., 2015) (Appendix - Figure 7)

Scientists have sounded the alarm for decades on the risk of unrestrained economic growth leading human civilization beyond the regenerative capacity of earth, but the majority of global institutions & industries continue to believe that growth can be made compatible with our planet's ecology. This response to environmental breakdown is called 'green growth' and its institutional proponents include the OECD, UN Environmental Program, the World Bank along with nearly all major economies in the world (Hickel & Kallis, 2020). The strategy depends on the decoupling of economic growth and throughput - defined as the energy and materials needed to support consumption & production.

Historically, production-side solutions have been viewed favorably by government & industry as they could be implemented with standard management practices with reward from private markets. Consumption-side solutions have largely been ignored due to the political and emotional nature of questioning national economic policy objectives and modern ways of living in affluent countries. The overemphasis on technological innovation, efficiency, and profit have not led to promising results in terms of reducing aggregate consumption & production and greenhouse gas emissions (Bengtsson et al., 2018). The well-documented rebound effect - Jevons Paradox - has shown that efficiency gains from energy and material improvements on the production-side are mostly offset by higher-levels of consumption (Reimers et al., 2021; Shove, 2018).

Decoupling can be achieved by recycling, shifting goods to services, designing better products and processes, substituting materials, and replacing fossil fuels with renewable energy. The rate of decoupling has to exceed the rate of economic growth, otherwise throughput remains the same or increases (known as relative decoupling). In dealing with ecological reality, what matters more is a decline in the total amount

of throughput as economic growth increases (known as absolute decoupling). Economists have studied empirical data and have determined that while absolute decoupling is possible in certain high-income nations, no evidence shows this to be true at the global scale even in optimistic scenarios (Hickel & Kallis, 2020).

The case for green growth is also supported by the successful combination of technological innovation and economic growth. During the Cold War, the Apollo Space Program established the United States national R&D apparatus and produced technologies that would lay the foundation for high-tech industries today. At the same time, GDP growth evolved into an ideology to prove the superiority of the US capitalist free market economy over the Soviet Union's state led economy (Barry, 2020). These events during the Cold War solidified US competitiveness on the global stage and after the 1970s, economists viewed science and technology as engines of growth. In her research, Carlotta Perez argues that technological revolutions occur in two distinct periods – installation with major bubbles and market crashes, and deployment where the government intervenes to spread the value created across the economy (Perez, 2009). Green technologies, the climate crisis, and growth have converged to present an opportunity that mirrors the past.

Unfortunately, green growth ignores the distributional issues related to sustainable consumption and production. The reality of overconsumption in rich countries and underconsumption in poor countries presents a grand challenge of creating a fair consumption space with equitable distribution of resources & opportunities with the remaining global carbon budget (Akenji et al., 2021) (Appendix - Figure 8)

The dichotomy of sustainability & growth creates a tension that will appear in any solution that has the potential to drive meaningful change in the status quo. The Degrowth movement in the field of economics assumes that absolute decoupling is not possible and attempts to resolve this tension by proposing a vision for the economy where throughput decreases while well-being improves (Fanning et

al., 2020; Giorgos Kallis, 2018). It remains to be seen whether sustainability and growth can co-exist, but it's clear that scientists & scholars have a point of view that is drastically different from current actors in the global economy.

Chapter 3: Forces that Shape Consumption & Production

In the literature of SCP, scholars have generated numerous theories and frameworks to conceptualize a system of consumption & production. These are commonly referred to as 'provisioning systems. There is no authoritative definition of the term and for this paper, I use the following definition: "a set of related elements that work together in the transformation of resources to satisfy a foreseen human need" (Fanning et al., 2020, p. 3).

3.1 PROVISIONING SYSTEMS

In this section, I will provide an overview and comparison of three provisioning systems that are frequently referenced by researchers in this field.

Sustainable Production-Consumption Systems:

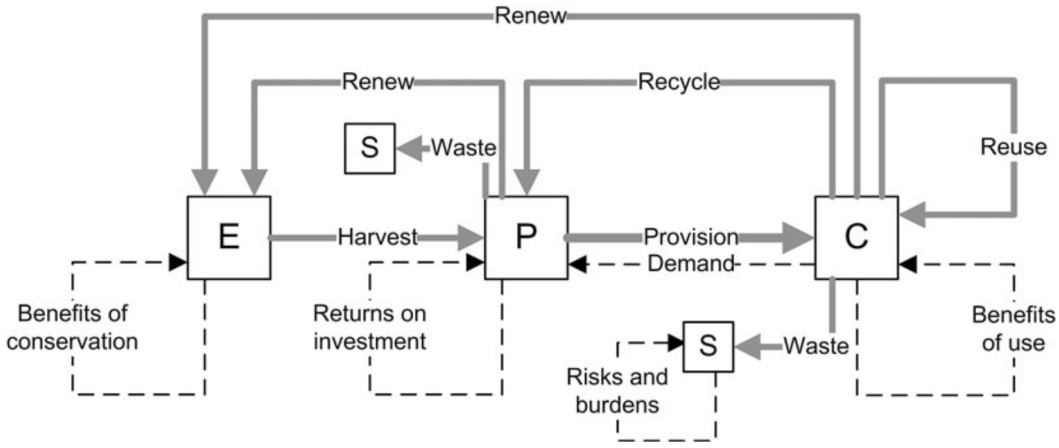

Figure 1

Material flows and derived utilities in a generalized production (P) and consumption (C) system that draws on environmental resources (E) and adds waste to sinks (S). Solid lines are flows. Dotted lines are derived utilities.

Sylvia Lorek and Louis Lebel define a production-consumption system (PCS) as a "system that links environmental goods and services, individuals, households, organizations, and states through linkages in which energy and materials are transformed, utility is derived, and relationships take place"

(Lebel & Lorek, 2008, p. 243). This framework (Figure 1) leans heavily on microeconomics in explaining the relationships and interactions between consumers & producers while incorporating concepts from industrial ecology to highlight linkages within a PCS that can be made more sustainable.

The framework suggests that action towards transforming a PCS is driven by an actor, but it does not clearly define who this actor should be. The main purpose of a PCS is to transform energy & materials into goods & services. Mechanisms are suggested on how to achieve this aim with a focus on altering production modes & processes, introducing standards for environmental performance, and changing consumption pattens through sustainable marketing initiatives.

Multi-level Perspective (MLP) on Socio-technical Systems:

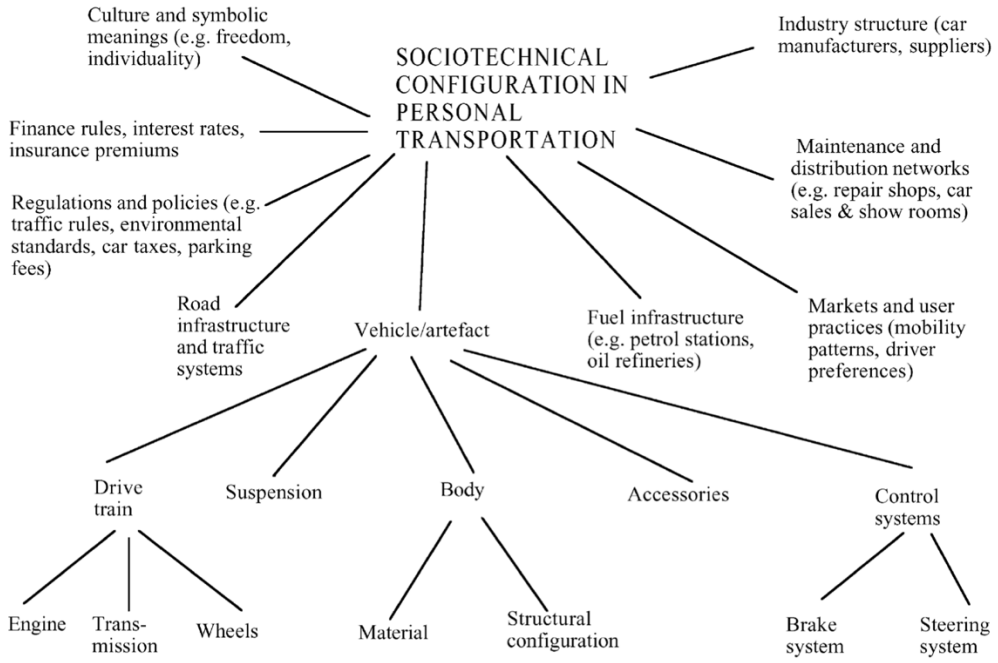

Figure 2 – Elements from the sociotechnical configuration in transportation (Geels, 2002)

Dutch scholars created the MLP approach to understand technology transitions in sociotechnical systems, which is a provisioning system that is built upon multidisciplinary knowledge in sociology & innovation studies (Geels, 2002). Sociotechnical systems are a configuration of techniques and artifacts along with an array of institutions, rules, practices, and networks that fulfill socially valued functions. This

concept takes a technology-oriented point of view on provisioning and focuses less on the role of consumers and producers.

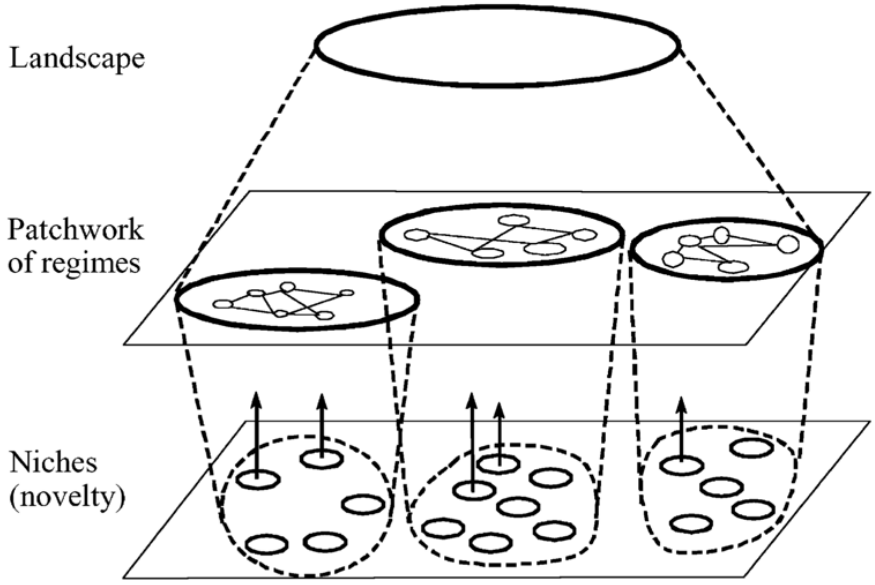

Figure 3 – Multiple levels of a nested hierarchy (Geels, 2002)

The MLP refers to 3 layers of a system where technology transitions occur (Figure 3). The macro-level is the landscape of dominant ideas, social currents, and historical trends at the scale of nations, regions, and the world. The meso-level is the regime where an incumbent sociotechnical system serves the needs of society. The micro-level is where niches exist that allow individuals and groups to experiment with new sociotechnical systems that can eventually displace an incumbent. Incremental change takes place at the meso-level while radical change emerges from the micro-level. (Brown et al., 2017; Kemp & Rotmans, 2005)

The MLP perspective on socio-technical change is useful for understanding the co-evolution of technology and society, but it does not provide much insight on how to tackle systemic issues related to sustainable consumption & production.

Systems of Provision:

Ben Fine created the Systems of Provision (SoP) approach to explain consumption through political economy and other social sciences as opposed to mainstream economics. In SoP, there are 5 interrelated drivers of consumption: agents who are participants in the system; structures with organizational, institutional, and social forms; processes that refer to specific activities; relationships among agents within the system; and material cultures where meaning is imbued onto goods & services. A key argument from the SoP approach is that consumption outcomes depend on the system by which a good or service is provided rather than a utility maximizing individual operating in perfectly functioning markets (Bayliss & Fine, 2020).

SoP is ambitious in scope for revealing the characteristics of a provisioning system that are often overlooked yet play a critical role in shaping patterns of consumption & production. However, there are some practical limitations to this approach. Due to the overlapping nature of these 5 consumption drivers, it is difficult to draw boundaries and to visualize the whole provisioning system with its distinct parts. The intentional distancing from mainstream economics results in SoP serving more as a versatile diagnostic tool for identifying intervention points in existing provisioning systems as opposed to offering a definitive representation of a provisioning system on its own.

Each of the three frameworks above is a powerful lens to examine consumption & production. The production-consumption system highlights the key steps in the provisioning process for goods & services and the relationship between producer & consumer. The MLP approach to Sociotechnical systems conceptualizes the function and structure of a provisioning system and connects them to the fulfillment of a societal need. Systems of Provision illuminates behavior within a provisioning system and potential leverage points for intervention.

That being said, none of the frameworks clearly define the actors of a system of consumption & production and how their interactions with one another translates into system behavior and output.

Furthermore, the frameworks do not shed light on the interplay between the system and individual lifestyles, which in Section 3.5, I argue is essential to the conversation on sustainability.

The Forces that Shape Consumption & Production (FCP) attempts to fill gaps in the 3 aforementioned frameworks by offering a holistic perspective on systems of consumption & production, which is distinct from provisioning systems. Provisioning refers to the production-side of a system whereas FCP also incorporates the non-obvious actors on the consumption-side. FCP focuses on how these actors influence the choices made available for consumption, their interaction dynamics, and the lifestyles that emerge. Metaphorically speaking, lifestyles are the tip of the iceberg and the system of consumption & production is the base. The framework was created by applying the system thinking & systems engineering methodology articulated in Section 2.1.

3.2 THE ROLE OF COMMUNITY, ENTERPRISE, AND GOVERNMENT

At the highest level of abstraction, the forces that shape consumption & production are situated in the three macro-level systems of society, industry, and government. Each of these systems consist of entities that are independent systems on their own. In order to effectively understand the inner workings of the system, we must move one layer deeper to examine the three entities of community, enterprise, and public institution (Figure 4).

Figure 4 - Entities

These entities have nonhuman and human elements, and therefore have both a function and purpose. A key design principle from architects in the late 18th century is form follows function. I extend this maxim by arguing that function follows purpose, which is the subject matter of philosophy and debate. Purpose is never fixed. If the purpose of an entity changes, then the form of an entity may change as well.

An individual is a participant in this system of consumption & production. Individuals are members of communities, employees of enterprises, and citizens of public institutions. In the language of systems thinking, an individual is a stock - the foundational element of a system. I explain the three entities in detail below:

Communities are social groups. Sociologists refer to community as forms of collective life in which people are tied together through tradition, interpersonal contacts, informal relationships, and affinities (Storper, 2005). Community does not necessarily mean that people need to belong in the same physical space. Technologies have made it possible for people to form communities across geographies in digital space.

At its core, the function of community is to create belonging by offering a structure for human connection and collective experience (Block, 2018). Although communities can have a variety of purposes as determined by its members, producing social capital is a purpose that cuts across all communities. Social capital refers to social networks, norms of reciprocity, mutual assistance, and trustworthiness. It can be created through building associations with similar types of people (bonding) or those who are different (bridging). The benefits of social capital accrue to society through enhanced trust, reciprocity, and collaboration amongst individuals (Putnam, 2000).

Enterprises are organizations that engage in commercial activity and its form is best understood through ownership design (Kelly & White, 2007). Ownership design consists of 5 elements: purpose, membership, governance, capital, and networks. Purpose is the most important element in determining the functions of an enterprise, but the other four ensure that those functions are enacted and held

accountable. The dominant enterprise form today is the publicly-traded corporation. Other forms of enterprise exist such as cooperatives, employee-owned firms, social enterprises, foundation-owned corporations, etc. (Kelly, 2013).

The size of enterprise ranges from enormous transnational corporations with global reach to small-scale enterprises with a handful of workers operating in both the formal and informal sectors. In the middle of this range are small and medium enterprises that participate in the economy at the regional or national-level (White, 2006). Technologies have made it possible for enterprises of all sizes to conduct business across national borders, especially in industries that produce intangible goods and services. The core functions of an enterprise revolve around production & provisioning.

Public institutions are organizations founded on a social purpose. Government is a system consisting of public institutions that serve the needs of society. History has produced several forms of government including democracy, autocracy, aristocracy, theocracy. Similar to enterprises, the purpose of government determines its form and functions. A discussion on the major philosophies of government is beyond the scope of this research.

In this thesis, my arguments are built upon **systems of consumption & production** in Western democracies. I adopt the perspective that "governments play a critical role as a trustee to ensure basic human needs are met in an equitable manner" (Ashford & Hall, 2019, p. 18). General functions carried out by public institutions on behalf of a government that is engaged in industrial transformation include: ensuring a healthy economy with sufficient earning capacity, providing adequate physical and legal infrastructure, creating opportunities for basic education and skills acquisition, protecting the environment, regulating harmful advertising, facilitating and arbitrating for stakeholders with competing interests, investing in path-breaking science and technology, and ensuring fair democratic political process (Ashford & Hall, 2019).

Before moving on to describe the relationships among communities, enterprises, and public institutions, a key point needs to be made regarding the duality of consumption & production. While

enterprises are typically associated with production and communities or individuals with consumption, all three of these entities engage in both production & consumption. Individuals are also capable of production without enterprises or public institutions as was the case in hunter-gatherer societies. Production requires a variety of assets to create value and it refers to the activities or processes associated with making a good or service. In political economy, ownership of the means of production is essential to understanding power within a system. We will further examine these power dynamics in Section 4.1

3.3 INTERACTION DYNAMICS

The relationships among communities, enterprises, and public institutions exist because of a functional value exchange in at least two of these entities. In the FCP framework, the dynamics of this exchange are important for identifying the center of power within the system (Figure 5).

Figure 5 – System Structure & Interactions

Firstly, the fundamental relationship between a community and enterprise is based on an exchange of labor for wages. Individuals provide their time, skills, and knowledge to support the activities of enterprise and receive income to fulfill their needs through the market. The dynamic of this interaction is best characterized by the concepts of consumer sovereignty and producer sovereignty, which were introduced by economist John Kenneth Galbraith (1985). Consumer sovereignty is built off the theories of Neoclassical economics and assumes that the initiative for consumption originates from the consumer. Consumers express their needs to the market and in turn, producers respond to fulfill this demand. Producers do not play a role in influencing the consumer's initiative and this direction of instruction from consumer to producer is called the 'accepted sequence'.

Galbraith observed that producers, specifically corporations, have the power to control the price of goods and services in the market and the ability to manage consumer demand through careful planning systems. Since producers had the resources to appeal to the psyches of consumers through advertising and product design, they had the power to create an initiative for consumption that otherwise would not exist. This direction of instruction from producer to consumer is called the 'revised sequence' (Galbraith, 1985, p. 264).

Next, the fundamental relationship between enterprise and government in the United States is based on the principle of free markets. Government ensures a stable economic environment for society by granting enterprises the legal license to operate as private entities that belong to shareholders (White, 2006). In Neoclassical economics, market failures occur when self-interested actors produce a less than optimal economic outcome. Governments are relegated to a role of intervening in the market to mitigate economic, social, and political harm. On the opposite end of the spectrum is the concept of industrial policy, which emphasizes government taking an active role in creating industries and altering the structure of the economy (Tucker, 2019). Advocates of industrial policy argue that major advances in society have come about from government initiatives to create public infrastructure, cutting-edge technology, and

social welfare programs (Mazzucato, 2018). Thus, the dynamic of the interaction is best characterized by the degree to which a nation state engages in free markets or industrial policy.

Third, the fundamental relationship between government and community is rooted in the social contract. The concept can be traced back to influential philosophers during the Enlightenment such as Thomas Hobbes, John Locke, Jean Rousseau, and Immanuel Kant. The main purpose of a social contract is to balance individual freedom with the greater good for society. Individuals relinquish certain freedoms and rights to a governing system in exchange for peace and security (Ashford & Hall, 2019, p. 58). Individual participation in civil society and democracy strengthens a nation's ability to improve the wellbeing of its citizens. The dynamic of the interactions is best characterized by the degree of individual & community participation. Higher participation results in more effective governance whereas lower participation results in the opposite.

3.4 SYSTEM BEHAVIOR

"System structure is the source of system behavior" (Meadows, 2008, p. 89). The structure of a system of consumption & production is based on the relationship among community, enterprise, and public institutions. Because the individual is the foundational element, the goal of the system and its entities are to fulfill human needs. Max-Neef's 1991 Model of Human-Scale Development is a frequently referenced sources for understanding human needs (Cruz et al., 2009). He argues that universal human needs are few, finite, and classifiable. These include subsistence, protection, affection, understanding, participation, recreation, creation, identity and freedom. Communication is a distinct social need that is missing from Neef's model. A provisioning system fulfills these human needs with satisfiers that improve well-being.

In the FCP framework, I argue that entities are in constant competition for power to influence the choices made available to the end user of the system - the human-being. The source of power is

capital, which comes in a variety of forms. I've already mentioned that social capital is produced by communities, but other types of capital include financial capital, political capital, human capital, cultural capital, and natural capital. In theory, an entity that has access to large amounts of capital or the ability to produce more capital will hold more power, which allows them to shape the behavior of the other entities.

Based on the interactions of these entities, the provisioning system will produce choices for an individual. Choices have many attributes, but the ones that matter for sustainability are the following: the price set by supply & demand which determines what is accessible, the profit which determines what is made available, the amount of energy & material usage throughout its lifecycle, the orientation as either a public or private good.

3.5 LIFESTYLE EMERGENCE

The arena where individuals are confronted with the choices made available to them by a provisioning system is where the framework shifts from a system-level of analysis to a human-level one. In this section, I explain the concept of 'Lifestyle Emergence' (Figure 6), which I define as a process in which individual choices evolve into habits and lifestyles. Lifestyle emergence implies that a system of consumption & production plays an outsized role in shaping individual behavior. Individuals can only make decisions on how to live based on the choices made available to them or through the choices that they independently create.

Figure 6 – Lifestyle Emergence

Lifestyles are important for several reasons: (i) Lifestyles shift the upstream design conversation from creating products to fulfill human needs to creating behaviors that consider both people and planet. (ii) Lifestyles bring focus to demand-side solutions for climate change and sustainability - bringing much needed attention to individual wellbeing and the concept of sufficiency. (iii) Lifestyles define our ecological footprint, which measures the collective impact of our purchasing decisions and subsequent behaviors. (iv) Lifestyles are a reflection of our identity and values, which are the determinants of individual and collective purpose. By surfacing the concept of lifestyles in rooms of power, we create a pathway for envisioning alternative ways of living that are drastically different from the unsustainable lifestyles of today.

Social practice theory (SPT) is a family of theories that offers a helpful lens to understand lifestyles and consumption. Practice refers to how individuals engage with everyday activities according to rules, norms, and societal context. SPT helps to expand our perspective on the variety of roles and activities that humans take on in addition to consumption, which is the focal point of microeconomic theories where individuals hold a title of 'consumer'. Sociologist Alan Warde helped to reconceptualize consumption as "not itself a practice but… rather, a moment in almost every practice" (Welch & Warde, 2015, p. 86). Shopping may truly be a practice of consumption, but other practices include caring, working, recreation, studying, inquiry, organizing, aggression, lending/borrowing, etc (Todorova, 2014).

The starting point of a lifestyle is the confrontation between choices and an individual's decision on whether or not to consume. This brief moment where a choice is made produces a set of behaviors. For example, the choice to purchase an apparel item leads to a host of behaviors such as washing, ironing, folding, or dressing oneself. A key argument in this paper is that the choices made available by the provisioning system determines which lifestyles emerge. Imagine a scenario where one might be deciding between the purchase of a fossil fuel vehicle or an electric vehicle. Although the electric vehicle is more environmentally friendly than a fossil fuel vehicle, public transportation may be the most beneficial for the environment and society because it ensures that mobility is accessible to those who cannot afford a car.

However, if a public transportation system is not constructed, then by default, an individual can only resort to purchasing a car.

These behaviors lead to habits, which are patterns of behaviors with three characteristics - repetition, automaticity, and contextual cues. Repetition describes behavior that is conducted with regularity and its cumulative effect leads to automaticity. Automaticity refers to an individual's lack of awareness, mental efficiency, and limited feelings of control due to the fluent nature of our everyday experience. Once a habit is formed, contextual cues may trigger the habit without one having to make a conscious decision and an individual's willpower is no longer necessary to engage in the habit (Verplanken & Roy, 2015).

In the end, lifestyles are the culmination of habits and patterns of behavior that give meaning to routines and choices. Sociologists point to the power of lifestyles to create self-identity, social conversation, and narrative. Lifestyles are a source of cultural capital and the most visible aspect of a system of consumption & production. Individuals observe the lifestyles and narratives of those around them and are motivated to create their own.

With regards to lifestyle and well-being, researchers have commented on certain behavioral traits that are quite consistent among most human beings. These observations provide a more nuanced understanding of lifestyles: (i) Humans are extremely adaptable and quickly adjust to their circumstances. (ii) Humans judge the emotional value of their material wealth in relation to others (iii) Humans will pursue fulfilling their needs and desires to have a better quality of life given the opportunities and necessary abilities (Akenji & Chen, 2016; Brown & Vergragt, 2016; White, 2006). Combined with Veblen's observation of conspicuous consumption, we can now see the phycological blueprint that enterprises & public institutions capitalized on to create the modern-day consumer.

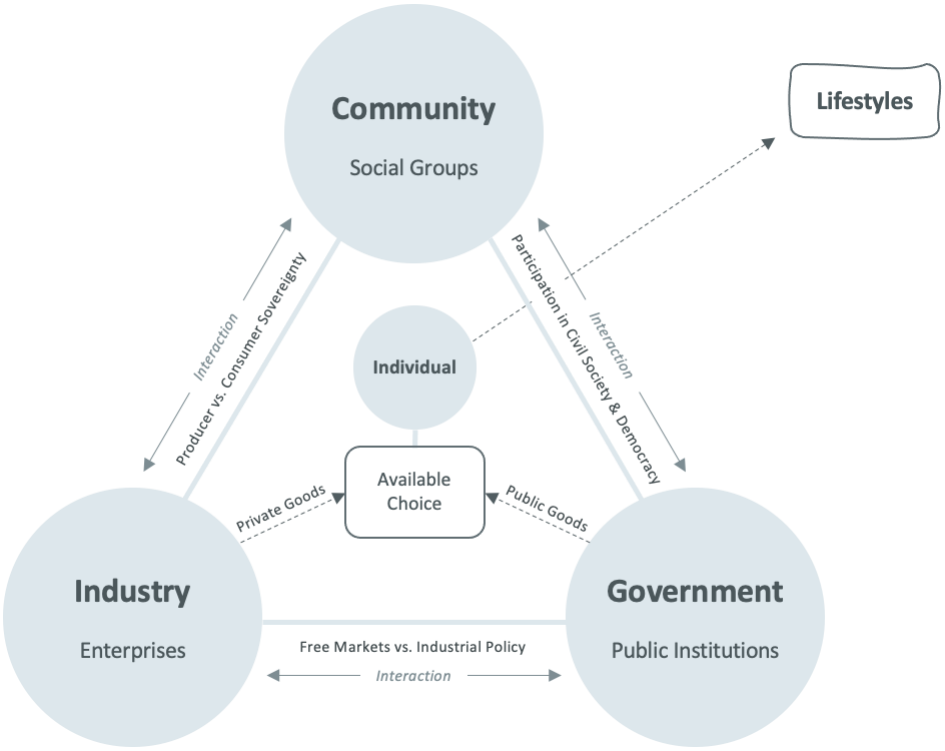

Figure 7 – Forces that Shape Consumption & Production

To summarize Chapter 3, the availability & preferences for private & public goods determine the choices that individuals make. Choices are shaped by community, enterprise, and public institutions, and the individual participates in all three. Choices determine the patterns of behavior that result in lifestyles that are either sustainable or unsustainable (Figure 7).

Chapter 4: Discussion

4.1 CORPORATE INFLUENCE ON LIFESTYLES IN THE GLOBAL NORTH

With the FCP framework in hand, I turn to the second research objective of this paper: to understand the influence that producers have over consumption patterns in the Global North, with analysis focused on the behavior of transnational corporations (TNC).

The relationship between business and society has been debated since the time of Adam Smith who recognized the issues of monopolistic practices by producers back in 1776. The East India Trading Company, considered the first transnational corporation, demonstrated this tendency to monopolize markets on behalf of the British and Dutch empires through its trading activities & colonization of foreign lands (White, 2006). Today, consolidation and market dominance by a handful of TNCs remains the norm in industries that significantly affect the biosphere (Folke et al., 2019). Smith's concern has morphed into the field of corporate social responsibility, which has been largely ineffective in making progress on sustainability as most commitments by TNCs are voluntary and not legally-binding. Furthermore, TNCs operate as a relatively autonomous authorities with power that rivals governments in nation-states (Ruggie, 2017).

I examine TNCs as opposed to small & medium enterprises because of their geographic reach, vast resources, and control over the levers of power. TNCs deal with an array of stakeholders including employees, customers, communities, suppliers, unions, governments, shareowners, and future generations (White, 2006). In the 21st century, the world's largest TNCs have revenues and balance sheets that exceed the GDPs of multiple countries (Khanna, 2016). While corporate power is a multifaceted concept and not restricted to financial capital (Dahl, 1957; Grant, 1997), it's very apparent to see it exercised through the mass production of goods & services, the control of commodity prices, and the crowding out of smaller competitors.

In the discussion below, the FCP framework is applied at a macro-level to examine TNC activities from 1900-2022. Publicly-traded transnational corporations have played an outsized role relative to other actors in driving overconsumption and its associated production of commodity goods & services, which have led to unsustainable lifestyles in the Global North. The behaviors below are not meant to be exhaustive and provide an overview of salient drivers of consumption & production that have undermined progress on sustainable development (Figure 5).

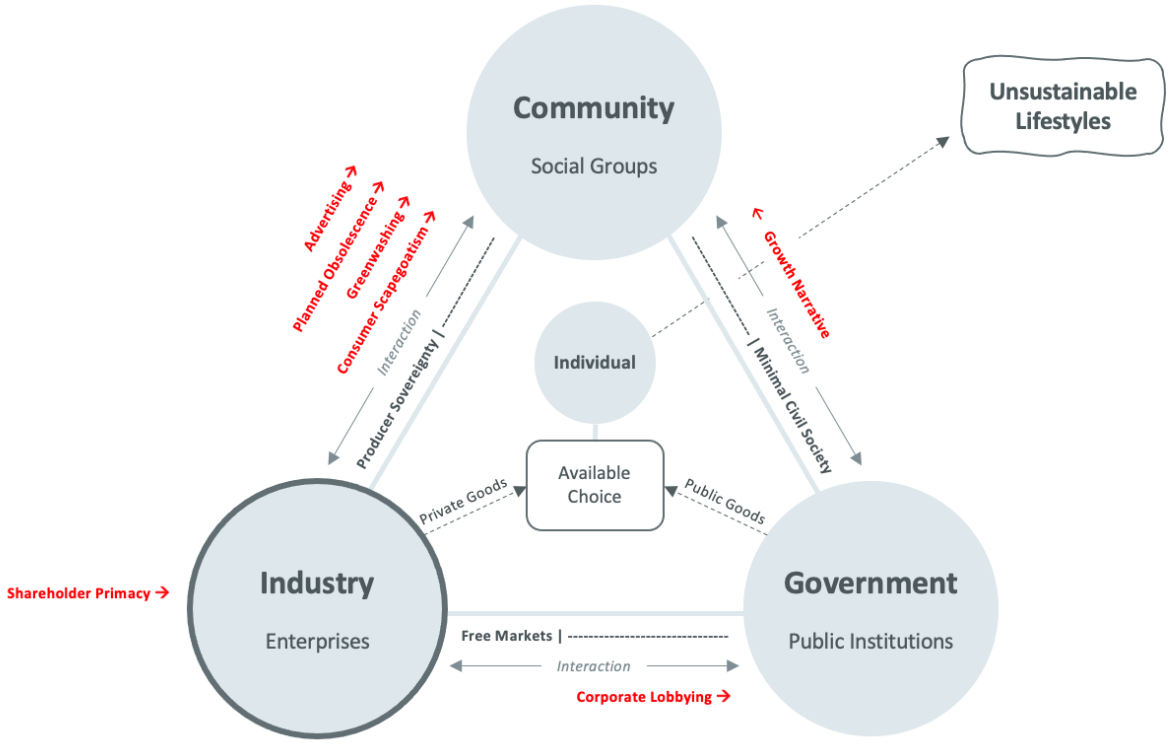

Figure 5 – Corporate Influence over System of Consumption & Production

Advertising

As an astute observer of affluent consumer society in the 1950s, John Kenneth Galbraith, coined the term the Dependence Effect which refers to the way consumer "wants are increasingly created by the process by which they are satisfied" (Galbraith, 1952). This process meant that producers have the power to drive higher levels of consumption through the use of advertising and demand management

techniques. Galbraith's prescient writing at the time faced criticism as there was no empirical evidence to prove the Dependence Effect to be true. However, researchers have examined these critiques using theory and empirical studies to show that Galbraith's arguments have stood the test of time (Dutt, 2008). Advertising indeed plays a significant role in expanding personal consumption but the effects vary depending on the consumption category and the accessibility of the good & service (Brulle & Young, 2007). Corporate advertising is also distinct from counter-advertising, whereby typically government seeks to reduce consumption by exposing the motives and marketing activities of producers (Dixon et al., 2020). Advertising has evolved from analog channels such as newspapers, print ads, billboards into sophisticated digital channels in radio, television, internet, and mobile technologies. The migration from offline to online forms of advertising has raised privacy concerns as the collection of personal data by providers may be involuntarily used for exploitation by industry (Evans, 2009). The daily inflow of advertisements from corporations to communities is a constant reminder of the need to consume - a need that has been ingrained in the minds of individuals since the early days of consumer society.

Planned Obsolescence

Advertising is part of a two-pronged strategy to increase consumption. The other half involves planned obsolescence (PO), the intentional production of goods with limited useful life. The origins of PO can be traced back to the Phoebus Cartel, a group of lightbulb manufacturers that agreed to engineer a shorter life span for the incandescent bulb in order to increase sales and profit (Krajewski, 2014). PO can manifest in 4 ways: functional obsolescence where products become outdated, psychological obsolescence where individuals are triggered to buy more, systemic obsolescence where a product system is made difficult to use or repair, and product failure due to poor construction and disposable use (Rivera & Lallmahomed, 2016). PO has defined business models around the frequent use and disposal of commodity goods and services in several industries such as fashion, consumer goods, electronics, and agriculture. Individuals in developed countries are habituated in a system of consumption & production

that is optimized for speed, convenience, and variety. As a result, engaging in throw-away culture becomes the social norm. Corporations are directly responsible for the upstream policies that have led to unnecessary environmental pollution and waste based on this linear model of the economy.

Greenwashing

As the negative environmental impacts from consumption & production became known to the general public in the 1960s, individuals & communities started to demand for change in corporate behavior. In order to quell the public concerns, corporations engaged in a practice known as greenwashing - the intentional positive communication of a producer's environmental performance to cover up a questionable environmental record. Corporations can mislead consumers about firm practices as well as the environmental benefits of a product or service (Delmas & Burbano, 2011). Greenwashing became a playbook for industry leaders to follow and its persistence in the market stems from a lack of accountability and the proper enforcement of environmental regulations. Greenwashing has also been weaponized as a form of advertising either to protect corporate brands by tapping into the eco-consciousness of consumers or to generate sales through the appeasement of environmental concerns without follow-through action. At its worse, corporations have used greenwashing to mislead the general public on critical sustainability issues, as was the case when the oil & gas industries ran media campaigns to discredit climate science and downplay the effects of global warming (Supran & Oreskes, 2020).

Consumer Scapegoatism

Unlike greenwashing where corporations conceal their activities, consumer scapegoatism refers to corporations laying the responsibility of addressing the environmental crisis on the consumer. Consumer scapegoatism is built on the belief that green consumerism, green growth, and green economy are possible and ignores the arguments of the ecological limits to growth (Akenji, 2014). In some cases, corporations are able to back their claims on eco-efficient products and environmental standards. In other cases,

corporations convince consumers to adopt sustainable behaviors that do little to address the growing environmental issues of emissions and waste.

The prime example is plastics recycling where again, oil & gas companies redirected public attention away from the true problem of a throw-away culture made possible by the production of cheap virgin plastic that are byproducts of fossil fuels - a case of consumer scapegoatism *and* greenwashing (Sullivan, 2020). Corporations obviously do not call this behavior consumer scapegoatism and the nature of this interaction is largely invisible due to the general public's belief in green technologies & green products as solutions for sustainability. Consumer scapegoatism serves to absolve corporations from taking action to enact the radical political, economic, and social transformations needed to create a more sustainable world - one that is less dependent on growth and profit.

Shareholder Primacy

Shareholder primacy refers to the ideology in corporate governance that the sole purpose of corporate activity is to maximize wealth for shareholders (Stout, 2013). This separation of ownership and management was made possible in the 1800s when joint stock arrangements allowed investors to participate in the wealth-generating opportunities of enterprise even though these capital providers were not involved in the daily operations or the community in which a business was embedded. Profit maximization became the guiding principle for shareholders and managers when Milton Friedman famously stated in 1970 that "there is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception fraud".

Built on the twin pillars of capital markets and publicly-traded corporations, shareholder primacy rose to prominence on the trend of corporate takeovers, deregulation, and financialization in the 1980s. (Davis & Kim, 2015) Although publicly-traded corporations have many stakeholders, the fact that

corporate managers are legally obligated and incentivized to answer first to shareholders means that problems related to sustainability will always be of lesser priority unless there is a profit maximizing opportunity involved. This governance issue is the engine behind all the drivers of consumption & production described previously.

Essentially, capital providers have become the hidden force behind corporate decision-making and they have far more influence than government and communities do to alter corporate behavior. When corporate managers move against shareholder interests, shareholder primacy is reinforced in three ways - hostile takeovers, stock options, and the firing of management. A clear example of this exercise in power is the 2021 ousting of Danone's sustainability-oriented CEO, who led several strategic initiatives during his tenure to align the company with environmental performance. Danone is one of the largest B-Corps in the world and this turn of events poses the question of whether publicly-traded corporations can truly make the right decisions on sustainability if shareholders & financial markets hold the keys to power.

Corporate Lobbying

Since the 1970s, scholars have also acknowledged that large corporations are a major influence on public policy within the United States, especially on matters that concern business operations (Epstein). The lack of transparency on the political relationship between industry & government makes it difficult to pinpoint specifically how corporations influence certain sectors of the economy. A simple reason for this opacity could be the mutual interest of corporations and politicians to keep this information hidden from the general public. The judicial system has also passed laws so that both groups are not legally required to disclose this data. Investigative journalists have led the charge in exposing corporate lobbying behavior and it is widely acknowledged that this lever allows corporations to bend legislation in favor of private sector interests on issues such as environmental regulation, taxation, subsidies, etc (Lyon et al., 2018).

It's important to recognize that corporate lobbying in favor of protecting the environment is not an indicator of good corporate behavior. If a corporation has a track record of opposing environmental regulation and is now in favor of pro-environment policies, then the question to ask is *why now*? Recently, large investor groups have put forth statements advocating corporations to use 'responsible lobbying' as a method to deploy public policy for climate transitions. They acknowledge that corporate lobbying has frequently opposed climate policies to deliver net-zero emissions. The main reason for a shift in industry position with regards to sustainability is that sustainability is now viewed as a business opportunity that fits within the managerial frame of maximizing profits for shareholders.

Taking into consideration these drivers of consumption & production, the dynamics of interaction among the three primary actors in the United States is best characterized by producer sovereignty and free markets. Publicly-traded corporations control the provisioning system and influence regulations to dictate choices for consumers in order to serve shareholder interests. The historical pattern of corporate action on climate change & sustainability is one characterized by avoidance, deception, acknowledgement, and very little follow-through action. A review of corporate responsibility reports from 2000-2014 showed that merely 5% of companies acknowledged the issue of ecological limits (Bjørn et al., 2017). Therefore, it's no surprise that lifestyles in the United States and other Global North countries remain unsustainable with little progress over the past decades. Industries & governments are motivated by profit maximization and unless climate change can be framed as an economic opportunity, there appears to be little incentive to act.

This system analysis brings together research and concepts from the field of Sustainable Consumption & Production in order to direct attention to the systemic drivers of overconsumption and its associated production. Much of this knowledge has been known for decades yet our society continues to engage in behaviors that are detrimental to future generations. How might we change this paradigm?

4.2 DESIGN INTERVENTIONS FOR SYSTEMS CHANGE

Another purpose of the FCP framework is to provide a "system map" that can assist individuals, community, industry, and government in designing for systems change. The framework facilitates a process of identifying leverage points – defined as "places within a complex system where a small shift in one thing produces big changes in everything" (D. Meadows, 1999; Mohai et al., 2009).

The most powerful leverage point to transform a system is the paradigm and the one we live in today is capitalism. Numerous scholars have analyzed the effectiveness of capitalism to serve the interests of society and its viability in the 21st century is debated more than ever. In this paper, I do not take a position on whether capitalism is the appropriate paradigm for a sustainable world, but I am of the view that an unwavering belief in the current system goal of world economies - GDP growth - *will* lead to eventual ecological collapse and devastation for human civilization. GDP growth is an anachronistic proxy for assessing the economy's ability to fulfill human needs and narrowly focuses on personal consumption, business investment, government expenditure, and global trade. Changing the ideology around growth begins with a conversation on purpose. In order to make progress on climate change & sustainability under the current paradigm, I argue that system designers must steer the system towards a new goal of improving human well-being regardless of whether top-down economic policy emerges to support this endeavor.

Once a goal is defined, the next step is to design interventions that can be applied to leverage points in the system of consumption & production. Design interventions are broadly defined as system-oriented solutions that can be a principle, rule, approach, metric, price mechanism, process, technology, product, etc. Interventions need to address one of the defining issues of capitalism – inequality (Ashford et al., 2020). On the economic dimension, studies have shown that capital return in developed countries tends to exceed the rate of economic growth and leads to wealth accumulation by the owners of capital. Within the United States, the wealth gap between America's richest and poorer families more than doubled from 1989 to 2016 (Pew Research, 2020). On the social and environmental dimensions, the

environmental justice movement has shown that the negative effects of climate change are felt disproportionately by the most vulnerable (Mohai et al., 2009). When examined through the lens of lifestyles, the richest in developed countries are responsible for the majority of GHG emissions and the poorest in developing countries barely have enough to fulfill their basic needs of survival (Akenji et al., 2021). For capitalism to remain the dominant paradigm in the 21st century and beyond, it must address the economic, social, and environmental inequalities that are consequences of the way that growth has taken place.

The FCP framework can also be used to connect design interventions to a recipient actor within the system of consumption & production. In contrast to the domain-agnostic analysis conducted in section 4.1, system designers should decide on an appropriate boundary that allows for higher fidelity analysis. A growing field of scholarship has pointed to urban centers as a major leverage point for systems innovation in climate change and sustainability. (Mansueto) Cities are a nexus for unsustainable lifestyles, employment opportunities, growing inequality, and linear systems of consumption & production that have resulted in enormous ecological footprints (Vergragt et al., 2016). In 2019, household consumption was responsible for 72% of global greenhouse gas emissions with the majority coming from mobility, food & agriculture, and housing domains (Dubois et al., 2019). Additionally, grassroots activism in this realm can potentially translate into political action and multi-stakeholder collaborations between the public & private sector. A global network of major city mayors has made pledges in accordance to the Paris Agreement and represent a formidable coalition (Data-Driven EnviroLab & NewClimate Institute, 2020).

Up to this point in the thesis, I have described consumption & production activities as essential components of a system in which both sets of activities are related and affect each other. The producers of goods & services in the system - enterprises, government, communities, and individuals – all influence the choices made available for consumption. The behavior of these four entities can be altered with design interventions that are classified in three categories. The first category refers to Practice Interventions

which are voluntary behavior changes in business practice. The second category refers to Cultural Interventions which are voluntary behavior changes due to changes in the cultural norm. The third category refers to Legal Interventions, which are mandatary behavior changes that influence choice through a change in law, policy, and regulation.

4.2.1 Practice Interventions

1) ***Mission-led Innovation Programs*** redefine the role of public institutions by having government take an active role in co-creating and co-shaping markets as opposed to passively fixing market failures. The intervention is focused on achieving sustainable consumption & production through industrial policy that rebalances the power dynamic between enterprise and government, and between enterprises and consumers. Proponents of industrial policy argue that governments are uniquely positioned to undertake long-term high risk innovation projects that the private sector would unlikely invest in. In order to succeed, governments need to adopt private sector innovation practices such as investing in a portfolio of R&D projects, nurturing organizational capabilities, and encouraging co-creation with an orientation towards public good (Mazzucato, 2018).

2) ***Ecodesign*** is a broad approach where the environment helps to define the direction of product design decisions. The intervention is focused on cleaner modes of production for enterprises through efficient processes and sustainable material choice that result in product efficiency improvements for individuals and communities. Design principles include lifecycle analysis, dematerialization, changes in energy generation, transmission, and use. Product strategies include the selection of low impact materials, reductions of materials in use, reductions of environmental impacts during product use phase, and extended product lifetimes. Process strategies include the optimization of production techniques, distribution systems, and end of life systems.

3) ***Product-Service Systems*** is a design concept where a set of products and services are integrated into a single solution that fulfill a user's need. (Mont) The intervention is focused on reducing consumption for individuals, communities, and enterprises by creating alternative scenarios of product use that result in more sustainable modes production for enterprises. The consumption mode will shift from ownership to access and individuals can benefit from customization and quality. (Vezzoli) The production mode will also change from linear to circular as enterprises will be responsible for processes associated with the recovery, reuse, refurbishing, and remanufacturing of a product. This closed-loop system will also require more cooperation with suppliers (Mont, 2002).

4) ***Ownership Redesign*** is the act of changing an enterprise's purpose from profit maximization to serving the public good. The intervention is focused on achieving sustainable production for enterprises by embedding its economic activity in the cultural and ecological context of a community. Alternatives to a shareholder-owned enterprise include cooperative ownership, employee ownership, community land trust, municipally owned enterprises, local ownership, tribal ownership, community covenants and easements, mission-controlled ownership (Kelly, 2009). A key component of ownership redesign is governance. By ensuring that sustainability is a core principle of an enterprise, managers can be rewarded for making long-term decisions that prioritize people and planet without facing repercussions from extractive financial owners.

5) ***Sharing Economy*** is a form of social organization that supports recirculation of goods and the exchange of services within a community (Curtis & Mont, 2020; Schor, 2016). The intervention is focused on reducing consumption for individuals through the collaborative consumption of

underutilized durable assets that results in higher levels of social capital and absolute reductions in production by enterprises. Collaborative consumption strengthens social cohesion and entails the activities of sharing, exchanging, swapping, and bartering. The sharing economy has the potential to drastically reduce energy & material throughput but faces the issues of rebound effects and governance. Platform businesses that enable collaborative consumption often lose their motivations for achieving sustainable consumption & production once they see an opportunity to scale.

4.2.2 Cultural Interventions

1) ***Individual Habit Change*** involves the adjustment of personal values and behaviors towards sustainable living. The intervention is focused on reducing consumption for individuals through a variety of strategies: reducing time spent on the social practice of consumption, engaging in less carbon-intensive activities, consuming more sustainable products, or becoming a 'prosumer', an individual who is engages in self-provisioning (Brown & Vergragt, 2016; Ritzer, 2015). Habits are extremely difficult to change and the 'habit discontinuity hypothesis' asserts that new habits are created when old habits are temporarily broken or suspended. Life transitions and crises such as becoming a parent or dealing with a global pandemic present a window of opportunity to change behavior. Thus, the task of diagnosing these periods when they occur or creating conditions for new habits to form becomes essential for a lifestyle change to be adopted. Government can play a role through the use of counter-advertising to raise awareness for sustainable living by bringing these strategies to light.

2) ***B-Corp Movement*** is a global community of for-profit enterprises that have made commitments to social purpose. The intervention is focused on achieving sustainable consumption & production by nurturing enterprises that prioritize both mission & profit. Reducing consumption

& production is not an explicit goal of B-Corps, but sustainability is often wired in their DNA. B-Corps are also certified by the B Lab, which measures how these enterprises perform on social and environmental dimensions. As a result, B-Corps are possible early adopters of long-term sustainable business practices. The majority of B-Corps are privately held and the growth of this community parallels the rise of stakeholder capitalism in transnational corporations. B-Corps are active in educating their stakeholders on societal change and represent a formidable coalition that interfaces with government and industry (Stubbs, 2017).

3) ***Ecovillages*** are experimental communal living arrangements that bring together individuals seeking alternative modes of living that are dedicated to sustainability (Nelson, 2018). The intervention is focused on reducing consumption & production by creating a form of social organization that enables the provisioning of goods & services in localized economies. Common characteristics include low impact living, collective goals & identity, decentralized governance (Ergas, 2010; Hong & Vicdan, 2016; Sherry, 2019) .

4.2.3 Legal Interventions

1) ***Legally-enforced mechanisms to alter Consumption & Production*** are government interventions that fall under two categories: a) direct controls by rules & regulation, and b) indirect controls by market-based instruments such as taxes & subsidies (Ashford & Hall, 2019). Direct controls mandate that consumers and corporations take action to reduce consumption & production. These can be performance standards such as the SEC's requirements for disclosures of climate-related risks by corporations or Southern California's conservation rules that forbid households from exceeding a quota on water usage. Alternatively, controls can be design standards such as limiting the square footage of homes to reduce material & energy throughput (Cohen) or consumption corridors, which establish a minimum & maximum threshold for individual

consumption (Fuchs). Indirect controls incentive behavior by imposing or removing costs for specific consumption & production activities. A carbon tax could effectively reduce GHG emissions and pollution by making carbon-intensive good & services more expensive, thereby encouraging a shift to lower-carbon alternatives (Rissman et al., 2020). Another set of policies could target pricing mechanisms by de-coupling profit taking from the unsustainable production of goods and services. By increasing the cost of overconsumption for consumers, producers will be rewarded for producing less assuming that prices are made accessible for those who require higher levels of consumption without the means to afford it (Ashford, 2016).

2) ***Redefining Growth Metrics*** can be the most powerful intervention for nation-states to advance sustainability through the adoption of new measures of economic development. The intervention is focused on achieving sustainable consumption & production across all entities by changing the system goal from GDP growth to improving well-being within planetary boundaries. The concept of well-being is not new and many organizations have offered alternatives to GDP. Since 1990, the UN has released an annual report on human development - defined as the process of enlarging people's choices so they may lead a long healthy life, acquire knowledge, and have access to resources for a decent standard of living. In the 2000s, prominent psychologists provided research that showed rising GDP per capita did not lead to higher life satisfaction beyond a certain income-level. They argued for policymakers to focus on social relationships, mental & physical health, and engaging employment as crucial indicators of a healthy society (Diener & Seligman, 2004). In 2020, Amsterdam became the first city in the world to adopt Kate Raworth's Doughnut framework for policymaking (City of Amsterdam, 2020). This intervention will likely be adopted by experimental governments bottoms-up since GDP is governed by the System of National Accounts, a global accounting framework, that is accepted by nearly all countries and macroeconomists.

3) ***Sufficiency Based Circular Economy*** is an approach to realize the full potential of the circular economy through policies that address consumption in addition to the phasing out of linear production processes (Bocken et al., 2022). Sufficiency is a concept that emphasizes the need to restrict resource consumption in line with planetary boundaries (Spangenberg & Lorek, 2019). The intervention is focused on reducing consumption & production for individuals, communities, and enterprises through government interventions that address the unsustainable production practices of enterprise mentioned in section 4.1. Examples of these policies in practice include mandating modularity in product design, extending producer responsibilities for end-of-life disposal, taxing packaging and landfill waste, penalizing marketing that leads to overconsumption, and the information provisioning of climate impacts from consumption choices. Under this approach, entities should encourage conscious consumption choices around the strategies of "refuse, reduce, and rethink" as opposed to recycling.

4) ***Universal Basic Services (UBS)*** is a framework for provisioning that serves the public interest through services as opposed to money or goods. Traditional services offered by the government in developed countries include education, healthcare, domestic security, social work. UBS expands this set to include housing, transportation, and childcare with the aim of creating a social safety net in solidarity. The intervention reduces private consumption for individuals and communities by increasing public consumption to stabilize employment and provide security for everyday needs (Coote, 2021; Diener & Seligman, 2004). As a publicly-owned provisioning system with a purpose rooted in sufficiency & sustainability, UBS directly addresses the issue of inequality and may be more effective than a market-based system at curbing overconsumption. However, questions remain on whether the public sector could deliver the same quality of service as the private sector.

4.3 LIMITATIONS AND FURTHER RESEARCH

While the FCP is useful as a heuristic to understand the relationship between lifestyles and a system of consumption & production, there are several limitations. FCP is a qualitative analytical tool that does not assess the efficacy of system design interventions on an empirical basis. An in-depth system analysis for the purposes of implementing a design intervention will need to incorporate feedback loops and measurement tools. These nuances have only been partially explored in this thesis.

The scope of this research is also limited to the consumption & production of commodity goods and services in the Global North with a primary focus on the United States. It is difficult to draw conclusions about specific cities, regions, states, and countries based on this macro-level analysis given the significant variations in cultural norms, rules, regulation, business practices, belief systems, and other contextual factors that clearly exist.

In terms of further research to enhance and operationalize the FCP framework, two areas of interest come to mind. First, identifying the barriers to implementation and the barriers to adoption of design interventions within and among the four entities would increase the likelihood of systems change to occur. An investigation into theories of change would be beneficial as systems of consumption & production are never static. Second, the integration of FCP with the human-centered design methodology could create a bridge between academia and industry. An exploration of important topics in this space should touch on system design principles, transition management, coalition building, measurement, and system prototyping techniques.

Chapter 5: Conclusion

5.1 SUMMARY

This thesis research defines 4 main actors that comprise a system of consumption & production - the individual, community, enterprise, and government. The system structure & interactions among these entities are represented by the Forces that Shape Consumption & Production framework. Entities are in constant competition for power to influence the choices made available to the end user of the system - the human-being. The private and public choices made available by this system determine which lifestyles emerge.

Using this framework, I investigated the influence of transnational corporations over consumption & production patterns in the Global North. Six corporate behaviors were identified that undermine progress on sustainable development. These include advertising, planned obsolescence, greenwashing, consumer scapegoatism, shareholder primacy, and corporate lobbying.

Finally, I take the viewpoint that if consumer society was systematically constructed, it can be systematically dismantled as well. Consumer culture is a complex social phenomenon that is difficult to change, but components of a system of consumption & production can be changed. The real task at hand is creating a new narrative around human well-being as opposed to GDP growth. Inequality needs to be addressed in a system design intervention. I conclude by recommending 12 design interventions that can be applied to various parts of the FCP framework. These include mission-led innovation programs, eco-design, product-service systems, ownership redesign, sharing economy, individual habit change, B-Corp movement, Ecovillages, legally enforced mechanism to alter consumption & production behavior, redefining growth metrics, a sufficiency based circular economy, and universal basic services.

5.2 A CALL TO ACTION

This thesis is not meant to assert a viewpoint on how one should live as there is no correct answer for that question. People's circumstances necessitate decisions that make sense for the opportunities & challenges in front of them. My goal in conducting this research was to present a more complete framing of the sustainability problem that is not presented in public discourse. As William Rees stated, "we are in collective denial of reality" (Rees, 2010). *What is that reality*?

The reality is that we do not have enough resources in the world for everyone to live like those of us in the consumer society of the Global North. Left unchecked, growth & overconsumption will lead to societal collapse. We must all shift to more sustainable ways of living. In order to change behavior, one must engage in the act of unlearning. What we take for granted is a result of ideas that have won the intellectual battles of their time. The people who argued for those ideas had limited foresight and may not have enacted them with inclusivity & sustainability in mind. We all have a tendency to see the good and downplay the bad. Human bias is inescapable.

As such, we have to confront the cognitive dissonance head on by asking deeply personal questions. Do ideas from the 20th century still make sense for the future we want to live in? What does well-being mean to me and what are the values that I want to live by? Change from a growth imperative to a sustainability imperative starts with purpose and commitment to something much greater than self. For those who accept the crisis in full, I conclude by offering 3 takeaways for action:

Firstly, achieving sustainable development requires collaboration by all four actors. While transnational corporations are the most influential and powerful, this thesis is not saying that the responsibility for addressing climate change & sustainability issues falls solely on them. We must direct our energy towards a common enemy – societal problems that have come about because of our species' competitive, tribalistic, and self-centered survival instincts that tell us there is not enough to go around. Rather than solving a symptom of the problem, we need to collectively attack its roots.

Secondly, leadership for tackling sustainability means acknowledging that one doesn't have all the answers, but has the ability to face the unknown and envision alternatives. Madeleine Akrich wrote "a large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a "script" or a "scenario". This quote is illuminating and shows that the creation of sustainable behaviors should not be left to chance by existing unsustainable systems of consumption & production. Leaders must have courage to imagine & experiment with ideas even if they appear radical or impossible at the onset. Failure will be unavoidable, but through the process of learning from failure, we can arrive at the many solutions needed to achieve sustainable development.

Finally, we know what needs to be done and there is no shortage of brilliant people who are thinking of ideas that can potentially address the wicked problem of climate change. The onus falls on those in positions of influence – business leaders, politicians, designers, technologists, cultural influencers – who have power to intervene in an unsustainable system of consumption & production by fighting for changes that would allow healthy, sustainable lifestyles to emerge. Power is not good or bad. The intention of the person with power is what truly matters.

References

Akenji, L. (2014). Consumer scapegoatism and limits to green consumerism. Journal of Cleaner Production, 63, 13–23. https://doi.org/10.1016/j.jclepro.2013.05.022

Akenji, L., Bengtsson Magnus, Toivio, V., Lettenmeier, M., Fawcett, T., Parag, Y., Saheb, Y., Coote, A., Spangenberg, J. H., Capstick, S., Gore, T., Coscieme, L., Wackernagel, M., & Kenner, D. (2021). 1.5-Degree Lifestyles: Towards A Fair Consumption Space for All.

Akenji, L., & Chen, H. (2016). A framework for shaping sustainable lifestyles: determinants and strategies.

Alfredsson, E., Bengtsson, M., Brown, H. S., Isenhour, C., Lorek, S., Stevis, D., & Vergragt, P. (2018). Why achieving the Paris Agreement requires reduced overall consumption and production. Sustainability: Science, Practice, and Policy, 14(1), 1–5. https://doi.org/10.1080/15487733.2018.1458815

Anantharaman, M. (2018). Critical sustainable consumption: a research agenda. Journal of Environmental Studies and Sciences, 8(4), 553–561. https://doi.org/10.1007/s13412-018-0487-4

Arnould, E. J., & Thompson, C. J. (2005). Reflections Consumer Culture Theory (CCT): Twenty Years of Research. Journal of Consumer Research, 31. https://academic.oup.com/jcr/article/31/4/868/1812998

Ashford, N. A. (2016). De-[Constructing] growth. In Sustainability (Switzerland) (Vol. 8, Issue 11). MDPI. https://doi.org/10.3390/su8111140

Ashford, N. A., & Hall, R. P. (2019). Technology, Globalization, and Sustainable Development: Transforming the Industrial State (Revised Edition). Routledge.

Ashford, N. A., Hall, R. P., Arango-Quiroga, J., Metaxas, K. A., & Showalter, A. L. (2020). Addressing inequality: The first step beyond COVID-19 and towards sustainability. Sustainability (Switzerland), 12(13). https://doi.org/10.3390/su12135404

Barry, J. (2020). A Genealogy of Economic Growth as Ideology and Cold War Core State Imperative*. New Political Economy, 25(1), 18–29. https://doi.org/10.1080/13563467.2018.1526268

Bauer, M. A., Wilkie, J. E. B., Kim, J. K., & Bodenhausen, G. v. (2012). Cuing Consumerism: Situational Materialism Undermines Personal and Social Well-Being. Psychological Science, 23(5), 517–523. https://doi.org/10.1177/0956797611429579

Bayliss, K., & Fine, B. (2020). A Guide to the Systems of Provision Approach: Who Gets What, How and Why.

Bengtsson, M., Alfredsson, E., Cohen, M., Lorek, S., & Schroeder, P. (2018). Transforming systems of consumption and production for achieving the sustainable development goals: moving beyond efficiency. Sustainability Science, 13(6), 1533–1547. https://doi.org/10.1007/s11625-018-0582-1

Bernays, E. L. (1928). Manipulating Public Opinion: The Why and The How. American Journal of Sociology, 33(6), 958–971. https://about.jstor.org/terms

Bjørn, A., Bey, N., Georg, S., Røpke, I., & Hauschild, M. Z. (2017). Is Earth recognized as a finite system in corporate responsibility reporting? Journal of Cleaner Production, 163, 106–117. https://doi.org/10.1016/j.jclepro.2015.12.095

Block, P. (2018). Community: The Structure of Belonging. Berrett-Koehler Publishers.

Bocken, N. M. P., Niessen, L., & Short, S. W. (2022). The Sufficiency-Based Circular Economy—An Analysis of 150 Companies. Frontiers in Sustainability, 3. https://doi.org/10.3389/frsus.2022.899289

Boss, P., Doherty, W. J., LaRossa, R., Schumm, W. R., & Steinmetz, S. K. (1993). Sourcebook of Family Theories and Methods. In Sourcebook of Family Theories and Methods. Springer US. https://doi.org/10.1007/978-0-387-85764-0

Brown, H. S., & Vergragt, P. J. (2016). From consumerism to wellbeing: toward a cultural transition? Journal of Cleaner Production, 132, 308–317. https://doi.org/10.1016/j.jclepro.2015.04.107

Brown, H. S., Vergragt, P. J., & Cohen, M. J. (2017). Consumption and social change: an introductory discussion and synthetic framework. In Social Change and the Coming of Post-Consumer Society (pp. 1–22). Routledge.

Brulle, R. J., & Young, L. E. (2007). Advertising, Individual Consumption Levels, and the Natural Environment, 1900-2000. Sociological Inquiry, 77(4), 522–542.

Camelia, F., & Ferris, T. L. J. (2016). Systems Thinking in Systems Engineering. INCOSE International Symposium, 26(1), 1657–1674. https://doi.org/10.1002/j.2334-5837.2016.00252.x

Chao, E. L., & Utgoff, K. P. (2006). 100 Years of U.S. Consumer Spending: Data for the Nation, New York City, and Boston.

Chappells, H., & Trentmann, F. (2015). Sustainable consumption in history: ideas, resources, and practices. In L. A. Reisch & J. Thogersen (Eds.), Handbook of Research on Sustainable Consumption (pp. 51–69).

City of Amsterdam. (2020). Amsterdam Circular 2020-2025 Strategy.

Cohen, M. J. (2019). Introduction to the special section: innovative perspectives on systems of sustainable consumption and production. Sustainability: Science, Practice, and Policy, 15(1), 104–110. https://doi.org/10.1080/15487733.2019.1703331

Cohen, M. J., Brown, H. S., & Vergragt, P. J. (2010). Individual Consumption and Systemic Societal Transformation. 6(2), 6–12.

Coote, A. (2021). Universal basic services and sustainable consumption. Sustainability: Science, Practice, and Policy, 17(1), 32–46. https://doi.org/10.1080/15487733.2020.1843854

Crawley, E., Cameron, B., & Selva, D. (2015). System Architecture, Strategy and Product Development for Complex Systems. Pearson Education Limited.

Cruz, I., Stahel, A., & Max-Neef, M. (2009). Towards a systemic development approach: Building on the Human-Scale Development paradigm. Ecological Economics, 68(7), 2021–2030. https://doi.org/10.1016/j.ecolecon.2009.02.004

Curtis, S. K., & Mont, O. (2020). Sharing economy business models for sustainability. Journal of Cleaner Production, 266. https://doi.org/10.1016/j.jclepro.2020.121519

Dahl, R. A. (1957). The Concept of Power (pp. 201–215).

Data-Driven EnviroLab, & NewClimate Institute. (2020). Accelerating Net Zero: Exploring Cities, Regions, and Companies' Pledges to Decarbonise Suggested citation Design.

Davis, G. F., & Kim, S. (2015). Financialization of the Economy. Annual Review of Sociology, 41, 203–221. https://doi.org/10.1146/annurev-soc-073014-112402

Delmas, M. A., & Burbano, V. C. (2011). The Drivers of Greenwashing. California Management Review, 54(1), 64–87.

Diener, E., & Seligman, M. E. P. (2004). Beyond Money Toward an Economy of Well-Being (Vol. 5, Issue 1).

Dixon, H., Scully, M., Gascoyne, C., & Wakefield, M. (2020). Can counter-advertising diminish persuasive effects of conventional and pseudo-healthy unhealthy food product advertising on parents?: an experimental study. BMC Public Health, 20(1). https://doi.org/10.1186/s12889-020-09881-1

Doran, P. (2021). Doing More with Less: Ensuring Sustainable Consumption & Production.

Dubois, G., Sovacool, B., Aall, C., Nilsson, M., Barbier, C., Herrmann, A., Bruyère, S., Andersson, C., Skold, B., Nadaud, F., Dorner, F., Moberg, K. R., Ceron, J. P., Fischer, H., Amelung, D., Baltruszewicz, M., Fischer, J., Benevise, F., Louis, V. R., & Sauerborn, R. (2019). It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures. Energy Research and Social Science, 52, 144–158. https://doi.org/10.1016/j.erss.2019.02.001

Dutt, A. K. (2008). The dependence effect, consumption and happiness: Galbraith revisited. Review of Political Economy, 20(4), 527–550. https://doi.org/10.1080/09538250802308919

Echegaray, F., Brachya, V., Vergragt, P. J., & Zhang, L. (2021). Sustainable Lifestyles after Covid-19. Routledge.

Ergas, C. (2010). A model of sustainable living: Collective identity in an urban ecovillage. Organization and Environment, 23(1), 32–54. https://doi.org/10.1177/1086026609360324

Evans, D. S. (2009). The Online Advertising Industry: Economics, Evolution, and Privacy. Journal of Economic Perspectives, 23(3), 37–60. http://ssrn.com/abstract1086473

Fanning, A. L., O'Neill, D. W., & Büchs, M. (2020). Provisioning systems for a good life within planetary boundaries. Global Environmental Change, 64. https://doi.org/10.1016/j.gloenvcha.2020.102135

Folke, C., Österblom, H., Jouffray, J. B., Lambin, E. F., Adger, W. N., Scheffer, M., Crona, B. I., Nyström, M., Levin, S. A., Carpenter, S. R., Anderies, J. M., Chapin, S., Crépin, A. S., Dauriach, A., Galaz, V., Gordon, L. J., Kautsky, N., Walker, B. H., Watson, J. R., … de Zeeuw, A. (2019). Transnational corporations and the challenge of biosphere stewardship. Nature Ecology and Evolution, 3(10), 1396–1403. https://doi.org/10.1038/s41559-019-0978-z

Fuchs, D., di Giulio, A., Glaab, K., Lorek, S., Maniates, M., Princen, T., & Røpke, I. (2016). Power: the missing element in sustainable consumption and absolute reductions research and action. Journal of Cleaner Production, 132, 298–307. https://doi.org/10.1016/j.jclepro.2015.02.006

Galbraith, J. K. (1952). The Affluent Society. Houghton Mifflin.

Galbraith, J. K. (1985). The New Industrial State. Princeton University Press.

Gasper, D., Shah, A., & Tankha, S. (2019). The Framing of Sustainable Consumption and Production in SDG 12. Global Policy, 10, 83–95. https://doi.org/10.1111/1758-5899.12592

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. In Research Policy (Vol. 31).

Giorgos Kallis. (2018). Degrowth. Agenda Publishing.

Grant, R. R. (1997). Measuring corporate power: Assessing the options. Journal of Economic Issues, 31(2), 453–460. https://doi.org/10.1080/00213624.1997.11505934

Hardin, G. (1968). The Tragedy of the Commons. Science, 162, 1243–1247. https://www.science.org

Hickel, J., & Kallis, G. (2020). Is Green Growth Possible? New Political Economy, 25(4), 469–486. https://doi.org/10.1080/13563467.2019.1598964

Higgs, K. (2014). Collision Course - Endless Growth on a Finite Planet.

Hilton, M. (2012). Consumer Movements. In F. Trentmann (Ed.), The Oxford Handbook of the History of Consumption. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199561216.013.0026

Hong, S., & Vicdan, H. (2016). Re-imagining the utopian: Transformation of a sustainable lifestyle in ecovillages. Journal of Business Research, 69(1), 120–136. https://doi.org/10.1016/j.jbusres.2015.07.026

IPCC. (2018). Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

Jay, J., Gerand, M., Gerard, M., Ashford, N., Matthew Swibel, M., & Martin, L. (2015). Accelerating the Theory and Practice of Sustainability-Oriented Innovation. http://creativecommons.org/licenses/by-nc/4.0/http://ssrn.com/abstract=2629683Electroniccopyavailableat:https://ssrn.com/abstract=2629683Electroniccopyavailableat:https://ssrn.com/abstract=2629683

Kelly, M. (2009). Keeping Wealth Local: Shared Ownership and Wealth Control For Rural Communities. www.yellowwood.org.

Kelly, M. (2013). The architecture of enterprise: Redesigning ownership for a great transition. Good Society, 22(1), 61–73. https://doi.org/10.1353/gso.2013.0000

Kelly, M., & White, A. (2007). Corporate Design: The Missing Organizational and Public Policy Issue of our Time. New England Law Review, 42, 761–786.

Kemp, R., & Rotmans, J. (2005). The Management of the Co-Evolution of Technical, Environmental and Social Systems. In M. Weber & J. Hemmelskamp (Eds.), Towards Environmental Innovation Systems (pp. 33–56).

Khanna, P. (2016, March). These 25 Companies Are More Powerful Than Many Countries – Foreign Policy. Foreign Policy. https://foreignpolicy.com/2016/03/15/these-25-companies-are-more-powerful-than-many-countries-multinational-corporate-wealth-power/

Krajewski, M. (2014, October). The Great Lightbulb Conspiracy. Spectrum IEEE.

Lebel, L., & Lorek, S. (2008). Enabling sustainable production-consumption systems. Annual Review of Environment and Resources, 33, 241–275. https://doi.org/10.1146/annurev.environ.33.022007.145734

Living Planet Report 2020 - Bending the curve of biodiversity loss. (2020).

Lyon, T. P., Delmas, M. A., Maxwell, J. W., Tima Bansal, P., Chiroleu-Assouline, M., Crifo, P., Durand, R., Gond, J. P., King, A., Lenox, M., Toffel, M., Vogel, D., & Wijen, F. (2018). CSR needs CPR: Corporate sustainability and politics. California Management Review, 60(4), 5–24. https://doi.org/10.1177/0008125618778854

Mao, C., Koide, R., & Akenji, L. (2019). Society and Lifestyles in 2050: Insights from a Global Survey of Experts.

Mathai, M. v., Isenhour, C., Stevis, D., Vergragt, P., Bengtsson, M., Lorek, S., Mortensen, L. F., Coscieme, L., Scott, D., Waheed, A., & Alfredsson, E. (2021). The Political Economy of (Un)Sustainable Production and Consumption: A Multidisciplinary Synthesis for Research and Action. In Resources, Conservation and Recycling (Vol. 167). Elsevier B.V. https://doi.org/10.1016/j.resconrec.2020.105265

Mazzucato, M. (2018). Mission-oriented innovation policies: Challenges and opportunities. Industrial and Corporate Change, 27(5), 803–815. https://doi.org/10.1093/icc/dty034

McKendrick, N., & Plumb, J. H. (2018). The Birth of a Consumer Society - The Commercialization of Eighteenth-century England. Edward Everett Root.

Meadows, D. (1999). Leverage Points: Places to Intervene in a System.

Meadows, D. H. (2008). Thinking in Systems: A Primer (D. Wright, Ed.). Chelsea Green Publishing.

Mohai, P., Pellow, D., & Roberts, J. T. (2009). Environmental justice. Annual Review of Environment and Resources, 34, 405–430. https://doi.org/10.1146/annurev-environ-082508-094348

Mont, O. K. (2002). Clarifying the concept of product-service system. In Journal of Cleaner Production (Vol. 10). www.cleanerproduction.net

Mountford, H., Waskow, D., Gonzalez, L., Gajjar, C., Cogswell, N., Holt, M., Fransen, T., Bergen, M., & Gerholdt, R. (2021, November 17). COP26: Key Outcomes From the UN Climate Talks in Glasgow. https://www.wri.org/insights/cop26-key-outcomes-un-climate-talks-glasgow

Nelson, A. (2018). Small is Necessary: Shared Living on a Shared Planet. Pluto Press. https://about.jstor.org/terms

Parker, K., & Horowitz, J. M. (2022, March 9). Majority of workers who quit a job in 2021 cite low pay, no opportunities for advancement, feeling disrespected. Pew Research Center. https://www.pewresearch.org/fact-tank/2022/03/09/majority-of-workers-who-quit-a-job-in-2021-cite-low-pay-no-opportunities-for-advancement-feeling-disrespected/

Perez, C. (2009). Technological revolutions and techno-economic paradigms. Cambridge Journal of Economics, 34(1), 185–202. https://doi.org/10.1093/cje/bep051

Pihkala, P. (2020, April 2). Climate grief: How we mourn a changing planet. BBC. https://www.bbc.com/future/article/20200402-climate-grief-mourning-loss-due-to-climate-change

Putnam, R. D. (2000). Bowling Alone: America's Declining Social Capital. In L. Crothers & C. Lockhart (Eds.), Culture and Politics: A Reader (pp. 223–234). Springer.

Rees, W. (2010). ARTICLE What's blocking sustainability? Human nature, cognition, and denial (Vol. 6, Issue 2). http://sspp.proquest.com

Reimers, H., Jacksohn, A., Appenfeller, D., Lasarov, W., Hüttel, A., Rehdanz, K., Balderjahn, I., & Hoffmann, S. (2021). Indirect rebound effects on the consumer level: A state-of-the-art literature review. In Cleaner and Responsible Consumption (Vol. 3). Elsevier Ltd. https://doi.org/10.1016/j.clrc.2021.100032

Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow, W. R., Zhou, N., Elliott, N., Dell, R., Heeren, N., Huckestein, B., Cresko, J., Miller, S. A., Roy, J., Fennell, P., Cremmins, B., Koch Blank, T., Hone, D., Williams, E. D., de la Rue du Can, S., … Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. In Applied Energy (Vol. 266). Elsevier Ltd. https://doi.org/10.1016/j.apenergy.2020.114848

Ritzer, G. (2015). Prosumer Capitalism. Sociological Quarterly, 56(3), 413–445. https://doi.org/10.1111/tsq.12105

Rivera, J. L., & Lallmahomed, A. (2016). Environmental implications of planned obsolescence and product lifetime: a literature review. In International Journal of Sustainable Engineering (Vol. 9, Issue 2, pp. 119–129). Taylor and Francis Ltd. https://doi.org/10.1080/19397038.2015.1099757

Røpke, I. (2020). Econ 101—In need of a sustainability transition. Ecological Economics, 169. https://doi.org/10.1016/j.ecolecon.2019.106515

Roy, V., & Singh, S. (2017). Mapping the business focus in sustainable production and consumption literature: Review and research framework. In Journal of Cleaner Production (Vol. 150, pp. 224–236). Elsevier Ltd. https://doi.org/10.1016/j.jclepro.2017.03.040

Ruggie, J. G. (2017). Multinationals as global institution: Power, authority andrelative autonomy. Regulation and Governance, 12, 317–333. https://doi.org/10.1111/rego.12137

SBTi. (2022). Science-based Net-zero: Scaling Urgent Corporate Climate Action Worldwide.

Schor, J. (2016). Debating the Sharing Economy. Journal of Self-Governance and Management Economics, 4(3), 2377–0996.

Sherry, J. (2019). The impact of community sustainability: A life cycle assessment of three ecovillages. Journal of Cleaner Production, 237. https://doi.org/10.1016/j.jclepro.2019.117830

Shove, E. (2018). What is wrong with energy efficiency? Building Research and Information, 46(7), 779–789. https://doi.org/10.1080/09613218.2017.1361746

Sorkin, A. R., & Merced, M. J. de la. (2022, January 17). Larry Fink's Letter to CEOs Says Stakeholder Capitalism Is Not 'Woke' - The New York Times. The New York Times. https://www.nytimes.com/2022/01/17/business/dealbook/larry-fink-blackrock-letter.html

Spangenberg, J. H., & Lorek, S. (2019). Sufficiency and consumer behaviour: From theory to policy. Energy Policy, 129, 1070–1079. https://doi.org/10.1016/j.enpol.2019.03.013

Stearns, P. N. (2001). Consumerism in World History (2nd ed.). Routledge.

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M., Persson, L. M., Ramanathan, V., Reyers, B., & Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. Science, 347(6223). https://doi.org/10.1126/science.1259855

Storper, M. (2005). Society, Community, and Economic Development. Studies in Comparative International Development, 39(4), 30–57.

Stout, L. A. (2013). The Toxic Effects of Shareholder Primacy. The University of Pennsylvania Law Review, 161(7), 2003–2023.

Stubbs, W. (2017). Sustainable Entrepreneurship and B Corps. Business Strategy and the Environment, 26(3), 331–344. https://doi.org/10.1002/bse.1920

Sullivan, L. (2020, September). Is Plastic Recycling A Lie? Oil Companies Touted Recycling To Sell More Plastic : NPR. NPR. https://www.npr.org/2020/09/11/897692090/how-big-oil-misled-the-public-into-believing-plastic-would-be-recycled

Supran, G., & Oreskes, N. (2020). Addendum to 'Assessing ExxonMobil's climate change communications (1977–2014). Environmental Research Letters, 15(11), 119401. https://doi.org/10.1088/1748-9326/ab89d5

The Economist. (2021, September 1). Billions are pouring into the business of decarbonisation. The Economist. https://www.economist.com/business/billions-are-pouring-into-the-business-of-decarbonisation/21803649

The White House. (2021, April 21). FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies.

Todorova, Z. (2014). Consumption as a social process. Journal of Economic Issues, 48(3), 663–678. https://doi.org/10.2753/JEI0021-3624480304

Trentmann, F. (2012). Introduction. In F. Trentmann (Ed.), The Oxford Handbook of the History of Consumption. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199561216.013.0001

Tucker, T. N. (2019). Industry Policy and Planning: What it is and How to Do It Better.

United Nations Environment Programme. (2021). Emissions Gap Report 2021: The Heat Is On – A World of Climate Promises Not Yet Delivered.

Veblen, T. (1899). The Theory of the Leisure Class.

Vergragt, P. J., Dendler, L., de Jong, M., & Matus, K. (2016). Transitions to sustainable consumption and production in cities. Journal of Cleaner Production, 134(Part A), 1–12. https://doi.org/10.1016/j.jclepro.2016.05.050

Verplanken, B., & Roy, D. (2015). Consumer habits and sustainable consumption. In L. A. Reisch & J. Thogersen (Eds.), Handbook of Research on Sustainable Consumption (pp. 243–253).

Victor, P. A., & Jackson, T. (2015). The Trouble with Growth.

Wang, C., Ghadimi, P., Lim, M. K., & Tseng, M. L. (2019). A literature review of sustainable consumption and production: A comparative analysis in developed and developing economies. In Journal of Cleaner Production (Vol. 206, pp. 741–754). Elsevier Ltd. https://doi.org/10.1016/j.jclepro.2018.09.172

Welch, D., & Warde, A. (2015). Theories of practice and sustainable consumption. In L. A. Reisch & J. Thogersen (Eds.), Handbook of Research on Sustainable Consumption (pp. 84–100).

White, A. L. (2006). Transforming the Corporation. http://www.gtinitiative.org

Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: Green consumer behaviour when purchasing products. Sustainable Development, 18(1), 20–31. https://doi.org/10.1002/sd.394