Altering Consumer Behavior: Business Strategies for Adoption of Renewable Plastics

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Introduction

Although the perceived risk of plastic pollution has increased due to a drastic increase in related scientific research in the 2000s (Wagner, 2018, pg. 209), global plastic use has not declined but rather continues to increase (Dengler, 2017) Plastic consumers may exhibit environmentally friendly viewpoints, but this does not translate to similar behavior (Rynarzewska, 2019). The result is that only 9% of produced plastics are recycled (Parker). This leads to significant microplastics from consumer and industrial plastic use landing in the environment and primarily impacting marine life. Some sources estimating that 100 million marine mammals are killed every year due to plastic pollution (Henn, 2019, n.p.)

Many consumers believe that it is not necessary for them to personally act to reduce plastic pollution, deferring the responsibility onto other consumers, businesses, or governments. This notion is false as actions from every relevant stakeholder are necessary to understand the magnitude of the problem with plastic pollution and ultimately fix it (Wagner, 2018, pg. 210). The struggle for responsibility leads to a crisis without any action.

> "In some ways, this crisis in accountability mirrors difficulties with climate change governance, particularly the difficulty of distributing responsibility and inviting individuals and households to change consumption and disposal habits in order to prevent global catastrophe," (Zimring, 2012, pg. 646).

Many businesses believe that they will lose money if they act sustainably, and governments do not have enough support to make drastic changes. Responsibility is poorly distributed and no one is taking sufficient action.

In this paper I argue businesses can practice in ways which are both economically and environmentally sustainable through alteration of their consumers' behavior and values. I use a

framework that uses Pacey's *Women and Wider Values* (1983) to assess individuals and their

paths to become more sustainable with Geels' *The multi-level perspective on sustainability*

transitions: Responses to seven criticisms (2011) to understand the role that community values

and business practices have in changing consumer values. In my technical thesis my capstone

group and I lay out, in detail, a production process for a sustainable plastic product. With further

development and implementation, this process would provide an accessible renewable plastic in

enough quantity to impact the current plastic market. The sociotechnical analysis I perform here

provides information that businesses must consider and use when moving their practices to be

more environmentally friendly in order to maintain their own economic sustainability.

The Primary Focus for Increasing Sustainable Behavior: Consumer and Business

Relationships

Consumers can exhibit behavior which can impact the environment in many ways,

positively or negatively. Paul Stern defines environmentally significant behavior from its

environmental impact, "the extent to which it changes the availability of materials or energy

from the environment or alters the structure and dynamics of ecosystems or the biosphere itself,"

(Stern, 2000, p.408). This definition, outlined in Table 1 below, adequately covers the potential

negative aspects of human behavior but does not give a similar significance to behavior which

could preserve the environment. This definition comes from human history before the 2000's and

is focused on the impact of behaviors. Desires to protect the environment have only relatively

recently become publicly valued, shown with significant research beginning in the 2000's

(Wagner, 2018, pg. 209). This sprouted an intent-oriented definition of environmentally

significant behavior focusing on an actor's behavior with the intent to impact the environment.

Each of these definitions must be considered with equal importance when addressing environmental issues like plastic pollution. The magnitude of the problem can only be understood with the impact-oriented definition, while the behavior that could cause or fix the problem is understood through the intent-oriented definition. Using these definitions Stern postulates, through a newly developed value-belief-norm (VBN) theory and data from various studies, that selfless or self-transcendent values lead to pro-environmental behavior (2000, p. 414). This is not a surprising result, as altruistic values lead to actions which benefit other actors. Studies also show that opposite values, such as egotism, are negatively correlated with pro-environmental behavior (Stern, 2000, p. 414). Altering consumer behavior then becomes complicated, as either their values need to change, or the result of their actions must be presented in a way which supports their values.

Environmentally Significant Behavior, Defined by Stern	
Impact Oriented	**Intent Oriented**
Significance of behavior defined by impact, primarily the negative impact	Significance of behavior defined by the intention to benefit the environment
Does not consider the idea behind the behavior	Environmental intent causes environmentally significant behavior, and intent can fail to lead to this behavior
Direct when impact is immediately caused by behavior	Aids in understanding beliefs and motives
Indirect when behavior changes basis for choices that directly impact the environment	Provides an understanding of certain behaviors
Largely defined by human desires	Must be considered to change human behaviors

Figure 1. Comparison of impact oriented definition of environmentally significant behavior to the more modern intent oriented definition (Created by Author).

Initially, economic values and environmental values seem to conflict with each other (White, 2019, p. 23). A few companies have shown that these values do not conflict, and instead can complement each other when implemented in the right way. Some of the sustainable behaviors of the co-op REI demonstrate this. Although REI is obligated to act sustainably because of their stakeholders, they balance this with economic goals. In the annual stewardship report in 2010, REI reported on their work to develop reusable packaging for bicycles that not only reduced waste packaging material by 68%, but also packed shipping containers 10% more efficiently, saving a significant amount of money on shipping costs, but also made it easier for workers to unpack and setup bikes in the store. The company then gave their Chinese bike manufacturer complete rights to produce this packaging, and REI would ship it back for reuse (2010, pg. 32). This resulted in a small growth in paper use compared to a large growth in company revenue and active members. This demonstrates that companies can exhibit environmentally significant behavior without necessarily taking any losses in their business.

Renewable plastics fall right into this framework. At first glance, they appear more expensive, underdeveloped, and the benefits to the environment may not be valued by important stakeholders. Looking past the surface shows how there is room for the renewable plastic market to pierce into the modern plastic market which consists almost entirely of plastics derived from the oil and gas industry (Day, 2018). Often, introduction of a more expensive renewable alternative appeals only to those which have pro-environmental values. Cost considerations and concerns about performance cause people without these values to avoid these alternatives (Yue, 2010, pg. 758). These researchers studied what they termed willingness to pay (WTP) with a study using plant pots to understand the spending behaviors of consumers. Interestingly, they found that consumers will change their spending habits and pay a premium for some renewable

alternatives, but this depended greatly on the characteristics and material makeup of the pot (Yue, 2010, pg. 769).

Willingness to pay is studied further by other researchers in different contexts. Rynarzewska discusses how consumer may exhibit an environmental mindset, but that does not translate to a high degree of willingness to pay when there are renewable alternatives present (2019, pg. 312). Altering consumer behavior now becomes crucial to any successful implementation of renewable materials. The primary conclusion of this article is that consumer identity in relation to green organizations is the most important factor for companies to consider when beginning to act renewably, in this case by implementing a plastic bag fee (Rynarzewska, 2019, pg. 324). Some data from implementation of a plastic bag fee is discussed below.

As with REI, this research demonstrates how businesses can act in ways which could change consumer behavior for environmental benefit. Understanding what actions to take to bridge the gap between attitude and behavior in consumers can bring light to economic and environmentally sustainable business decisions (White, 2019, pg. 23). These researchers propose a framework to influence consumer behavior, called the SHIFT framework. Each letter touches on an aspect of human activity, each being S, social influence, H, habit formation, I, the individual self, F, feelings and cognition, and T, tangibility. Following this framework, the researchers list 25 important considerations and lessons that businesses should consider when acting to impact their consumer base, which can ultimately benefit not only the environment through their business practice and consumer behavior, but also their own economic goals (White, 2019, pg. 38). Using this framework, businesses can tackle Zimring's crisis in accountability by using their own power to push consumers to behave sustainably.

Sustainable Changes Require Changes in Business Policy

Many sociotechnical frameworks will provide enough material to adequately analyze this system, but I use more specialized analyses that focus on human values or sustainable systems to provide a more thorough analysis. A chapter from Arnold Pacey's "The Culture of Technology" discusses ethical disciplines that actors must develop in order to value practical and sustainable uses for technology. Pacey introduces the chapter, *Women and Wider Values*, with an individual struggle for personal values. "For the individual, the effort to seek a balance between virtuosity values and user or need values involves more than giving assent to an ethical principle; it requires also a discipline and a process of personal ethical development," (Pacey, 1983, pg. 112). An individual, or a consumer in this case, must discipline themselves to value virtuosity heavily, not simply their personal needs.

The process of personal ethical development begins with a introspective reversal of values, where individuals turn, "…away from playing with magical power to accept the discipline of ordinary work," (Pacey, 1983, pg. 114). Consumers must reflect on their values and decide if they are justified for serving their community. This is the second step of the process, where the work and values that come from an individual's reversal are used as, "A work of charity," (Pacey, 1983, pg. 114). Often these steps work with each other, and a value that benefits humanity will be used to do exactly that. Finally, Pacey introduces innocent contentment. An individual must be content with their actions and values in order for them to become a part of the identity of the individual. This process needs to be facilitated in order to promote ethical development in a group of people.

To gain a more thorough perspective of the sociotechnical system I use Geels' survey, "The multi-level perspective on sustainability transitions: Responses to seven criticisms."

Pacey's work develops a framework for analysis of the primary individual human actors in this system, and Geels analyzes sustainable transitions in terms of the larger groups of actors involved. "… sustainability transitions are necessarily about interactions between technology, policy/power/politics, economics/business/markets, and culture/discourse/public opinion," (Geels, 2011, pg. 25). Of these, the most relevant actors to my research are the business and marketing groups, as well as culture and public opinion and how those develop and impact an individual's values. A primary issue Geels introduces is the presence of lock-in mechanisms. These are elements of a system that discourage abrupt changes, such as infrastructure or consumer preferences that are accustomed to an existing system.

A sociotechnical regime is a structure in which existing systems exist and evolve. Consumer beliefs and practices dictate the rules of these regimes. This makes the system characterized by lock-in, which minimizes the change in the system (Geels, 2011, pg. 27). Niches create room for change in the regime as researchers and developers work together to innovate. Niches can develop through three processes, "The articulation of expectations or visions, … The building of social networks and the enrolment of more actors," and "Learning and articulation processes on various dimensions," (Geels, 2011, pg. 28). As each of these processes develops, a niche can accelerate and begin to truly impact the sociotechnical landscape that it shares with regimes.

Although it seems that assessing niche development shows how quickly a landscape will change, the progression is not so simple. Geels suggests that this occurs through three steps: "(a) niche-innovations build up internal momentum, (b) changes at the landscape level create pressure on the regime, and (c) destabilization of the regime creates windows of opportunity for niche-innovations, " (2011, pg. 29). This is a slow process and only occurs effectively in the long

run. One criticism of this model is that it focuses on change occurring from the bottom-up, always beginning with niche development. While this may not be an exclusive method for sustainable sociotechnical development, if a technology or niche is not developed in a way where it could put pressure into the sociotechnical landscape, then the space will be filled by the existing regime and no meaningful change will occur. The regimes in this model are heavily influenced by politics and government, but I will neglect this from the framework and focus on aspects from businesses, marketing, and public views or opinions.

These works provide an adequate framework to analyze the magnitude and effectiveness that business practice can influence consumer values. In this system, the Geels' niches are newly developed renewable materials that currently act as a small-scale alternative but could grow quickly and pressure the current regime. Observation of this growth and the subsequent reaction in the regime can provide evidence to show the impact that the presence of renewable alternatives is having on the landscape. The goal in a renewable transition is enough pressure to shift and destabilize the regime to take in the niche, making renewable plastics a part of everyday life.

The presence of environmental values in society indicates that many people have begun their process of ethical development, but pressure from businesses and public views is necessary to push consumers to continue into the second stage where they begin to act on their values for charity. This analysis shows where research can be focused, specifically on influence of consumer habits, to assess whether the business actions are effective. The assessment developed from Pacey's framework is not a new idea, nor is it exclusive to renewable practices. This methodology could be implemented to study political influence or consumer behavior alteration for other purposes.

Evidence of change in consumer behavior from business practices comes from studies relating to consumer use of renewable plastics after these are made available and marketed to them. A useful study is that on plastic straw use. While somewhat politically influenced, in the case of bans in some places, there is data assessing influence of business practice on consumer change in regions where business practice is the interesting evidence. This was done in a study by Travis Wagner, where three policy approaches were studied; a full ban of plastic straws, a partial ban, or default choice modification, which is when there is no ban present but straws can only be supplied when specifically requested. The survey was conducted on businesses which used default choice modification as a method to reduce their straw consumption. Of 133 survey responses, the median decrease in plastic straw consumption was 30% while only 14% of the responders reported no decrease in consumption. (Wagner, 2018, pg. 5).

Taylor (2015) conducted a study on consumer behavior in response to plastic bag bans and fees. The figure below shows how a change in policy lead to a reduction in consumer use of disposable bags. Interestingly the study includes data on stores that implemented a ban on single use plastic bags, only supplying paper at a cost, and stores that implemented a fee on both paper and plastic bags. In both situations, consumers reduced their disposable bag use, but significantly more so in the stores that supplied an inexpensive reusable plastic bag even though it was the most expensive option for them to choose at the time. For other businesses to have a similar impact, supplying inexpensive reusable bags will ultimately reduce use of disposable bags.
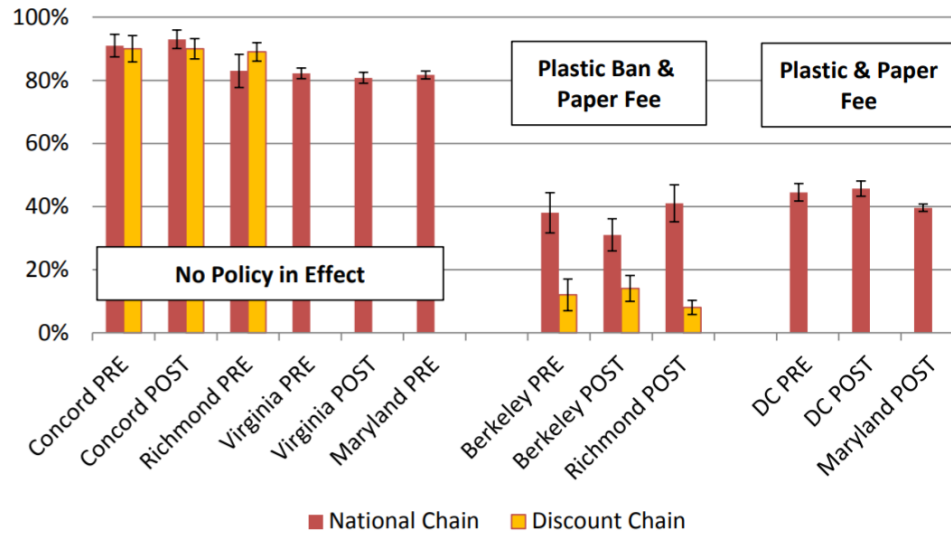
Figure 2. Proportion of customers using disposable bags in various policy jurisdictions. PRE and POST refer to the behavior measured before and after the implementation of policy changes. National and Discount Chain refer to each of grocery chains studied, with the former implementing a 5-cent charge per paper bag and the latter charging 10-cents per paper bag and 15-cents for a reusable plastic bag (Taylor, 2015, pg. 33).

Homonhoff performed a mathematical study to assess the relative impact of a tax on disposable bags and a reward for reusable bags. It would initially seem that both of these business policies would achieve the same result, but in fact the tax has a much more pronounced impact on consumer behavior, cutting disposable bag use in half (Homonhoff, 2015, pg. 26). One of the major arguments that supports this conclusion is the tangibility of the tax as it is presented on every checkout screen. This pushes into the SHIFT model and makes the negative impact tangible for the consumer while the positive impact may not be. In this case, both the tax and reward were only 5 cents, a similar scale to the evidence presented by Wagner but at even lower costs for most situations. An economic and individual reason for this behavior is the reduced elasticity for disposable bag demand when compared to other goods (Homonhoff, 2015, pg. 26). Consumers may be willing to pay more for something that they actively consume, like food or beverage, but not for a disposable bag. This agrees with the work from Wagner as well. Consumers are not

excluded when addressing the accountability crisis that Zimring laid out. Their change in behavior is not solely the responsibility of the businesses, and consumers must be held accountable as well.

Progression through analysis methods is summarized below in Figure 3. This portrays how the work from Pacey and Geels provides a method for effective analysis of the evidence presented above, leading towards the results of this research.
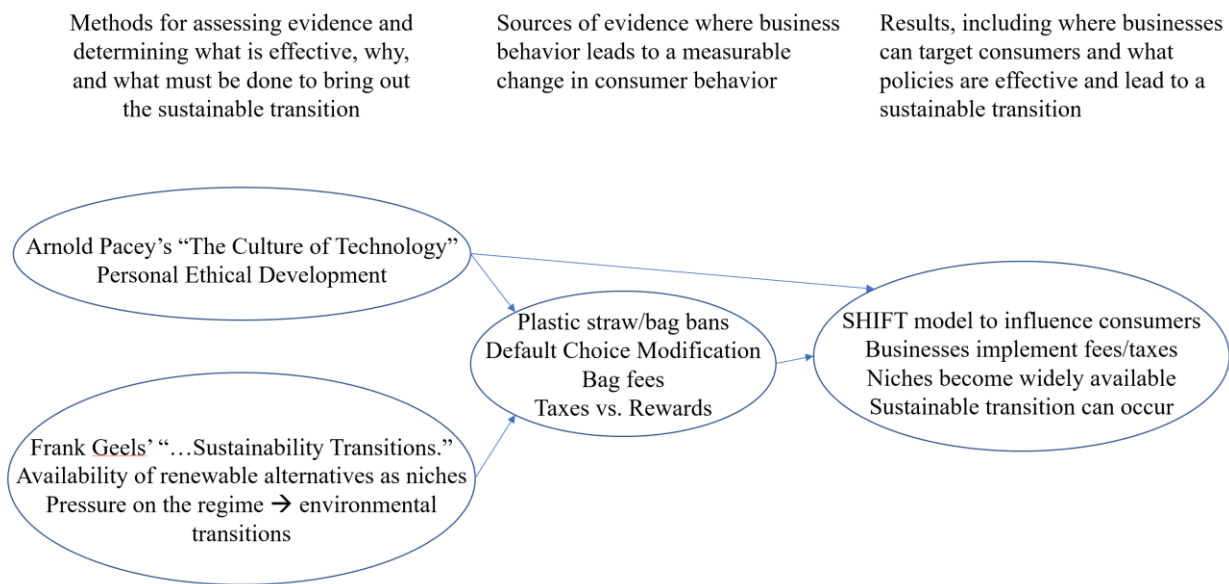

Figure 3. Flowsheet indicating methods development and research. Two primary models are selected, used to analyze sources of evidence, and finally yielding a framework for businesses to consider when changing policies to bring out sustainable transitions (Created by Autor).

The framework made from Geels' survey provides methods to analyze the interactions between technology and businesses, consumers, and policy. While this covers the major societal components of my system, it neglects the individual. Pacey's work discusses the path that individuals follow to achieve personal change for the betterment of society. This completes the framework as it now encompasses an entire society form the individual up to the most organized groups of people. Each of these perspectives focus on changes for the betterment of society.

Taxes and punishments are the most effective strategy to bring out change in consumer behavior

Case studies from above confirm my argument that businesses can be both economically and environmentally sustainable. While alteration of consumer behavior appears to be enforced on the consumer without their consent, it is a necessary component to bring out sustainable behavior. As stated previously, consumers tend to defer their responsibility to be sustainable onto other stakeholders, which makes manipulation necessary as consent may not be achieved. While plenty of research suggests methods or avenues for businesses to interject into the life of a consumer to change their views, the path for sustainable consumer behavior begins with a forced push from businesses. Pressure may originate at the political level, but the actor that implements the changes conveys these to the consumers is the business.

A forced push can be more effective than a method of enticing consumers with a reward. Initially it seems that rewarding consumers for good behavior will be as effective as punishment for poor behavior, but Homonhoff (2015) discusses how this is not observed. The system of discouraging harmful behavior, with a tax or penalty, is far more effective in changing consumers habits. Using the T from the SHIFT model (White, 2019) makes this easy to understand. To shift consumer behavior, the impact needs to be tangible. This is not the intended definition of tangibility, as this model covers tangibility in the context of the benefits of the sustainable behavior. Consumers may not see the benefits that small rewards for sustainable behavior bring them, but they certainly notice the benefits of avoiding punishment or taxing. Immediate punishments are far more tangible than small rewards, making them more effective in changing consumer behavior.

REI stands as an idealistic example for economic and environmental sustainability. What sets them apart from others is their business model as a co-op with their primary stakeholders being those that value conserving and being in the environment. Fundamentally, businesses must cater to their stakeholder values in order to be economically sustainable. This means that REI is obligated to be environmentally sustainable as well. While more and more stakeholders are valuing environmentally sustainable business practices, this portion is not enough for businesses act sustainably; a short-term financial incentive is required. This is where willingness to pay becomes very important. If businesses can increase pricing to supply a renewable alternative, similarly to the reusable plastic bag that was implemented in the study by Taylor above (2015), then they can make more money while pursuing environmental goals.

Initially it appears that bans or organized change, on the political or business level, are required for sustainable changes to occur. Consumers appear to be simple minded and resistant to change, leaving the responsibilities to others. This is somewhat true, but there is space for action that does not consist of a ban to lead to sustainable behavior. Allowing plastic bags to stay in stores with a tax on them will cause consumers to change their behavior and begin to use reusable bags more often. Small changes like this are appealing as it doesn't cause any sort of shock to consumers which may cause them to change their shopping location to avoid the new changes rather than change their behavior around bag use. An improved understanding of the system leads to more effective practices when changing consumer behavior. This is compared with current conventional wisdom below in Figure 4.

Alteration of Current Views to an Improved Understanding	
Conventional Wisdom	**Improved Understanding**
Positive reinforcement leads to consumer happiness and change	A tax or punishment will cause the greatest impact on consumer decision making
Economic and environmental sustainability conflict in business practice	Sustainable environmental practices can lead to economic success in the long term
Political influence is necessary for real impact	Businesses connect more closely with a given population and can lead to a much larger impact
Consumers are not willing to pay more for a sustainable alternative	With correct implementation, consumers will pay to be sustainable
Many renewable alternatives are not sufficiently developed for consumer use	Willingness To Pay leads to economic incentive to make renewable alternatives available to consumers
Bans or organized change are required for sustainable transitions	Taxes and punishments will lead to consumer change without the necessity for political involvement.

Figure 4. Comparison of current wisdom possessed by businesses and consumers to an improved understanding developed in this paper (Created by Author).

It also seems that businesses are seldom acting on their own to promote sustainable change. News articles cover political changes, like the extensive coverage of the Seattle plastic straw ban, but businesses implementing these provisions are either sparse or get little recognition. This leaves a societal gap where there are sustainable actions but little social influence (S from the SHIFT model) as a result of these actions. A potential solution to this could be involvement of more community actors, like the media. They also need to play their part in pushing for a sustainable transition in modern society; they must be held accountable, per Zimring. News coverage could not only bring light to good actions, but also push their consumer base to act more sustainably and to recognize sustainable behavior. This will also help push

consumers down their journey of ethical development and help them see how their actions can benefit the community.

Conclusion

As global plastic use continues to present environmental problems, businesses must act in environmentally significant ways to prevent further harm to marine life. Business influence their consumers through interactions and specific interactions can lead to a change in consumer behavior. Implementation of default choice modification and small fees on plastic products causes consumers to reduce their usage and choose alternatives when available. This research demonstrates that for effective sustainable change to occur, consumer choice is not the most effective path. Implementing policies that a consumer thinks that they do not want, like a fee for specific behavior, will influence and change their behavior more effectively than the policies that the consumer likely wants.

This research I have presented shows where businesses can change their policies to get their consumers to behave sustainably. Ideally, this research will influence the ways that businesses make their decisions and how they interact with consumers while pushing for sustainable transitions. Businesses must conduct further research to assess whether the change in consumer behavior is long lasting and whether it extends to other businesses that the consumer interacts with. With further research and data that studies various sustainable business policies, businesses can choose the most effective method to implement that will result in environmentally friendly habit formation. Once businesses begin to implement policies like those discussed above, increased availability of renewable alternatives, as my technical thesis aims to develop, will follow and lead to societal sustainable transitions which benefit the world that we live in.

On my honor as a student I have neither given nor received aid on this assignment/exam

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