Engaging Consumers in Ethical Consumption: The Effect of Real-time Environmental Information on Eco-friendly Consumer Choice

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Abstract

Encouraging consumers to make environmentally sustainable consumption and behavioral choices is a major issue in the 21st century with implications for the well-being of humanity in the future. For consumers to take responsibility for the environmental impact of their consumer choices, they must be provided environmental impact information on the products they purchase. In this paper, we develop a theory of real-time environmental information and eco-friendly consumer choice. Our model emphasizes the role of information systems in providing consumers with information on the environmental and social impact of products at the time of purchase. We contend that this information will have an effect on consumer purchasing decisions by increasing their environmental impact knowledge and environmental impact saliency, which encourages eco-friendly consumer choice. This research provides insights for producers and policymakers who endeavor to engage consumers in sustainable consumption.

1. Introduction

Encouraging consumers to make environmentally sustainable consumption and behavioral choices is a major issue in the 21st century with implications for the well-being of humanity in the future [62]. The UN recognizes sustainable consumption as an important means for combatting poverty, reducing CO2 emissions, and ensuring fair trade and the just distribution of resources [28]. Sustainability is a state in which the satisfaction of present needs do not impede on the fulfillment of future needs. While the need for sustainable consumption behavior might be clear, the means of achieving it are less so. Many of the existing production methods for agricultural and other products threaten sustainability without consumers being aware of it. For example, the intensive use of antibiotics in farm animals and fish threaten to increase the presence of bacterial illnesses that are resistant to antibiotics, thus threatening the well-being of future generations, and yet consumers are unable to voice their disapproval through their purchases because they are unaware of the processes used in the production of the particular meat, poultry or fish they are considering buying. Similarly, the genetic modification of food products threatens to lessen biodiversity and may lead to epidemic hazards. However, consumers are often unaware of whether, or not, the food product that they are purchasing is genetically modified. And while it is considered well known among environmentalists and agricultural scientists that livestock and meat production is environmentally unfriendly [42], the average consumer has little understanding of the environmental impact of meat production and hence, makes food consumption decisions without any awareness of the consequences. In order for consumers to assume responsibility for the consequences of their consumption choices, they must be equipped with knowledge of the consequences of such choices.

Consumers are becoming increasingly concerned about the effects of their consumption on the environment and on other people [2,41,47]. Consumers are beginning to seek assurance that the products they consume are safe and produced in a way that is environmentally and socially conscious [46]. One way consumers can reduce the impact of their consumption and promote sustainable production is by purchasing ethically sourced products, an activity referred to as ethical consumption [29]. By engaging in ethical consumption, consumers reward companies with ethical practices in line with their personal values and punish companies whose practices are not socially responsible [36]. Reports indicate that consumers are taking their ethical concerns to the marketplace by purchasing socially conscious products [14,27]. In the United Kingdom, ethical product sales increased by 12% in 2013 and the ethical product market is estimated to be worth €54 billion [26]. As the demand for eco-friendly
products (products that are good for the environment) grows, companies will respond by meeting that demand by providing products that are sustainably produced.

Currently, consumers must rely on product labels to inform them about the ethical attributes of a product. Product labels such as organic, Fair-trade, or Energy Star, act more as symbols for consumers, rather than providing adequate information about the environmental impact of the product [11]. Print labels are limited in the amount, variety, and complexity of information they can communicate [5]. Although many companies publish reports documenting their socially responsible activities, consumers have to search for this information and it is not readily available at the time of purchase. Consequently, consumers do not have access to the information needed to assess the impact of their consumption choices at the point of the decision, creating an information asymmetry between producers and consumers.

One way to address the information asymmetry is with the use of product traceability systems. Product traceability systems (PTS) are used in supply chains of various industries to track information on a product, and the processes enacted on a product, as it works its way from raw material to retail [20]. Industries implement traceability systems in order to manage their supply chains and to verify compliance with industry or government standards. Existing research on PTS has inquired into the main reasons that have justified their development. For example, a primary motivation behind food PTS is the enabling of rapid recall in the event of a food contamination incident. While such motivations have been adequately explored, research on PTS has not investigated the effects of PTS on consumers’ willingness to make sustainable choices. PTS have the potential to extend beyond retailers to consumers to inform them about the ethical attributes of products; a concept known as “ethical traceability” [8,20]. When extended to the consumer, PTS provide real-time information about the provenance, environmental effects, safety, and social impacts of products at the time of purchase. Resultantly, PTS can provide consumers with the information needed to make sustainable consumption choices.

In this paper, we merge two streams of research in order to build a theory of real-time information and environmentally sustainable consumption behavior. One stream is the research on product traceability, which has largely focused on IT systems to improve product traceability along supply chains from raw materials to retailer; the second stream is the ecological consumer research which has sought to identify the factors that motivate consumers to practice sustainable consumption. Our theory provides insights into how PTS facilitate eco-friendly consumer choice. This research will extend our knowledge regarding the influence of real-time information that is influential in encouraging sustainable consumption behaviors.

2. Product Traceability Systems

The motivations for introducing product traceability systems (PTS) vary. In some industries, NGOs have pushed large companies to be more transparent in order to assuage stakeholder concerns over the environment, the working conditions of factories from whence supplies originate, or the inadvertent funding of rebel groups. For example, the Kimberly Process sparked in large part by the Fatal Attraction movement of the Global Witness NGO resulted in a system whereby the origin of diamonds, and whether or not they are “conflict diamonds,” must be transparent to purchasers [12]. The United States Students Against Sweatshops movement was largely responsible for Nike’s eventual disclosure and the subsequent monitoring of the work-condition quality of its factories, a move that was then followed by other major clothing retailers [24].

Advocates of factory disclosure argue that transparency of the supply chain encourages corporations to be more attentive to the practices and working conditions in the factories supplying their products and thereby encourages better working conditions through pressure from the retailer who is pressured by the informed consumer. Similar movements have been seen in the fur industry (the “I’d rather be naked than wearing a fur” movement), and the cell phone industry (the “Pas de sang sur mon GSM” movement) [12].

In other industries, it is less NGO and stakeholder pressure than government mandates that are forcing the issue of product traceability. For example, the EU directive 178/2002 requires food businesses in Europe to have systems and procedures in place to be able to identify the other businesses to which they have supplied products and from which they have received products. Tracking (forward moving along the supply chain) and tracing (backward moving) are compulsory in the EU. A primary motivation behind food PTS is the enabling of rapid recall in the event of food contamination and a targeted recall such that only affected products are removed. According to estimates from the Centers for Disease Control (CDC), 48 million Americans get sick and another 3,000 die annually from foodborne diseases [18]. Food contamination incidents triggered 75 food recalls in 2013 alone [58]. Recent outbreaks have been attributed to tomatoes, peanut butter, cantaloupes, spinach, and ice cream. Food PTS help to quickly identify the products that must be removed from store shelves and help minimize losses to the suppliers because only those lots affected by the
contamination need to be recalled. Among the most advanced PTS is of meat producers. In the EU, strict regulations are in place for feed and food producing animal production. The law requires herd-keepers to record which animals consumed what feed such that in the case of a feed recall, individual animals that consumed the feed can be identified and removed before entering the human food chain. As part of this traceability system, each animal must have an ear tag with an individual identifying code and animal passport. In addition to the agriculture industry, the pharmaceutical industry is also being pressured by governments to implement traceability systems [51]. As with agricultural PTS, the primary objective of pharmaceutical PTS is to enable quick recalls in the event of a drug contamination.

With government and NGO-backed initiatives, the PTS extend from raw material suppliers to retailers, but few extend to consumers. The primary objectives of the traceability systems revolve around risk management and food and drug safety, control and verification of product origin, supply chain efficiency, and quality assurance [20]. However, an enormous potential of PTS has yet to be tapped, and that is in the realm of providing information to consumers to enable them to make ethical consumption choices. This is referred to as “ethical traceability” [20].

3. Ethical Traceability and Eco-friendly Consumer Choice

Consumers have a plethora of ethical concerns about products, including environmental sustainability, animal welfare, product safety, employee welfare, and labor conditions [9,23,29]. Studies indicate that consumers want to be more informed about food ingredients, quality attributes, and food production methods [40,52,57,59,63]. Product labels do not adequately address these concerns; however, PTS have the ability to capture and store ethical attribute information on products as they move through the supply chain [20,43]. Ethical traceability depends upon item-level product traceability systems and is envisioned as a means of supplying consumers with information on the environmental impact of products with a view towards encouraging sustainable consumption. This information is critical for consumers who desire to make purchasing decisions based on the impact a product has had on the environment and society during its production. When PTS are extended to the consumer, ethical information that was formerly hidden, or resource intensive to obtain, is now readily available to the consumer at the time of purchase. Given the unique affordances of PTS, we argue that they play a key role in facilitating eco-friendly consumer choices.

To date most PTS extend from raw material suppliers to retailers, but few extend to consumers. However, major retailers are beginning to eye PTS as a means of reassuring consumers of product quality, safety, and environmental impact. Walmart has recently notified its supplier partners that, in support of the Produce Traceability Initiative (PTI), all suppliers must have standardized case labels that are consistent with PTI standards in order to guarantee freshness to consumers [55]. Also as part of the PTI, start-up companies are developing mobile phone apps to provide information to consumers as they shop. HarvestMark is one such app that allows consumers to scan the HarvestMark bar code on produce items and receive information on whether the item is organic, whether it has preservatives, where it originates, and the safety status of the product [64]. We refer to such systems as item-level PTS. We expect significant growth in item-level PTS systems prompted by consumers who are increasingly aware of the importance of sustainability and of ethical product development.

There is a small body of research addressing the question of how consumers can be encouraged to purchase sustainable products [35]. Most of the existing research has indicated that consumers are more likely to purchase sustainable products when they are provided with environmental and economic arguments for purchasing products [28]. Extending traceability to consumers does add to the product costs, as do sustainable production practices. As such, consumers must be convinced that the measures to improve sustainability are worth the higher prices that they must bare [44], [45]. A study of Canadian consumers of beef sandwich found that consumers were willing to pay 7% more for traceability itself and up to 40% more when traceability was associated with higher quality and safety [13]. Similarly, one third of Canadians were willing to pay more for items produced using environmentally sustainable or pesticide free production methods [31]. Other studies have shown that people’s willingness to purchase environmental friendly products depended on whether or not people believed that the products were linked to environmental problems [56]. This emphasizes the important role of knowledge in consumer sustainability choices: information about the environmental problems associated with the production, trade and consumption of products will be an important factor in decisions between conventional and sustainable purchases.

Taking stock of the existing literature, we argue that even if the motivation behind the development of traceability systems has been well documented, the literature has not sufficiently examined the impact of
ethical traceability information disclosure on ethical consumer choice. It also follows that the aspects of information transmitted via PTS, which have the most impact on consumer choice, also remain unexplored. Our research aims to fill this gap by addressing the effect of ethical attribute information, provisioned by PTS, on eco-friendly consumer choice.

4. Theoretical model

In order to study sustainable consumer choice, we present a model of real-time information and eco-friendly consumer choice, seen in Figure 1. We draw from literature on ethical consumption, environmental sustainability, and traceability to develop propositions that inform our understanding of PTS and its role in facilitating eco-friendly consumer choice. Specifically we are interested in exploring the effects of real-time environmental impact product information in terms of influencing ethical consumer choices. We draw a fundamental distinction between the provision of real-time information as opposed to a non-real-time/offline mode of information disclosure, which is primarily facilitated with product labels. Product traceability apps, like HarvestMark, provide up-to-date information on a product, so consumers can see exactly where a product has travelled and if there are any issues with the quality or safety of a product.

While a number of studies have explored the benefits of RFID tagging systems on organizational and/or supply chain efficiency [4,65,66], our knowledge regarding the relationship between information disclosure and consumer choice remains limited. In order to examine the aforementioned relationship, we draw insights from the limited number of PTS studies that have inquired into some of the challenges associated with PTS information disclosure. For instance, we take into account the work of [65], who have identified a number of shortcomings with label information, such as low readability, no standard of permissible level of specific ingredients, the possibility of fabrication or forgery of an information label, and difficulty in reading information printed on a label. Moreover, labels do not currently include some relevant environmental information such as the CO2 footprint of a product, because it is not known at the time of production where an item will end up [65].

Product labels have been found to be ambiguous, confusing, and ineffective in informing consumers about ethical product attributes [10]. A study on the effectiveness of eco-labeling found that they did not reduce information disparity between the producer and consumer, nor did they inform buyers of the product's ecological impact, or provide a way to verify whether or not the producer was compliant [5]. These findings imply that current information available in stores is not adequate for consumers to make an ethical purchasing decision. We contend that environmental information provisioned by PTS will provide consumers with the information they need to address their ethical concerns. In sum, we endeavor to determine whether real-time information will act to inform the consumers about the environmental and social impacts of products, as well as increase the importance of this knowledge, which will, in turn, influence consumer choices.
4.1. Environmental impact knowledge

Although consumers may want to consume ethical products, they still lack information on how they can achieve that goal [60]. Studies investigating the reasons why consumers report they will consume ethically, but fail to do so when shopping, contend that consumers struggle to identify environmentally conscious products or ethical companies [15,30]. Traceability information informs consumers of the impact the product had on the environment during production, shipping, and storage. When this information is made available to the consumer, she will be informed of the full production history of a product including the provenance of all materials in a product, storage time, animal welfare, the resources expended to produce the product, and the waste materials generated during production [57].

To demonstrate how this information is different from that which is communicated through traditional labels, we will use the example of an organic label. Suppose a consumer sees a label indicating that a shirt is made with organic cotton; this label does not necessarily inform the consumer about the production methods used to make the cotton and how this process is eco-friendly. With PTS, a consumer could scan the label and discover that the cotton is grown without any harmful chemicals, a process which uses less water, supports biodiversity and improves the quality of the soil. Similarly, an organic label on a meat product might signify to consumers that the product does not contain harmful chemicals, but it fails to communicate how the animals were treated or what impact on the environment the production of the product entailed. With a traceability app, the consumer would also be informed that the livestock was fed organic feed and allowed to roam in the outdoors.

Additionally, PTS could apprise consumers of any eco-friendly methods used during production. This is especially helpful when a company has gone above and beyond the requirements to receive an eco-label because the producer can communicate directly with the consumer about their efforts to produce eco-friendly products. For example, by using a product traceability app, a consumer might be informed that the factories where a product was produced runs solely on renewable energy or that the company has eliminated harsh chemicals from a product line. By using PTS, consumers receive a full picture of a product’s history, including all aspects of the impact a product has made on the environment. This information could prove to be a deciding factor for consumers choosing between a traditional product and a sustainably produced product.

When consumers are knowledgeable about environmental and social problems, and the role of ethical consumption, they are more inclined to make ethical consumption choices [15]. Consumers with knowledge of fair trade and the impact of a product on the economic welfare of producers were more likely to purchase fair trade products [6,49]. In a more recent study, [17] found that consumers who consistently purchased eco-friendly products were well-informed about the environmental impact of the products they purchased. For these reasons, we argue that ethical product information will increase consumer knowledge of the environmental and social impact of a product, and encourage eco-friendly consumer choice.

**P1a:** The provision of real-time product information via PTS will increase consumers’ knowledge of the environmental impact of their consumption choices.

**P1b:** Consumers’ knowledge of the environmental impact of their consumption choices will have a positive effect on eco-friendly consumer choice.

4.2. Environmental impact saliency

While PTS inform consumers of the environmental and social impact of a product, it also serves to elevate the importance of eco information when the consumer is in a position to act. According to agenda setting theory, individuals perceive an issue as more important when they hear about the topic in the media [38,39]. In a study on election issue saliency in the 1968 U.S. presidential election, researchers found that the top five issues discussed in the media (both newspaper and television) during three weeks leading up to the election were also ranked by a group of undecided voters as the most important issues in the election [38]. When individuals hear or read information about a topic, such as climate change, they are more inclined to think about the topic and perceive it as important. It follows that when consumers are reminded of the environmental impact of a product they are purchasing, they are more likely to view the information as important and use it to inform their purchasing decision.

Media attention given to environmental issues has significantly increased in the last decade [53], which indicates that consumers are thinking more about social and environmental issues before they enter the marketplace. However, this increase in media attention does not necessarily indicate that consumers are thinking about ethical issues when they shop. In an experimental study by [33], participants were shown a short, two-minute video about air pollution, while the control did not receive any information. The participants who saw the clip rated the issue of reducing air pollution as more important than the control group [33]. Traceability apps have the ability display information about eco-friendly choices on the consumer’s mobile devices.
device, thereby temporarily elevating the importance of eco-friendly choices when the consumer is shopping. Research on issue importance also suggests that consumers are more likely to engage in a behavior that they feel is important and impactful [33]. Therefore, we propose:

**P2a:** The provision of real-time product information via PTS will increase the saliency of environmental impact to the consumers.

**P2b:** Environment impact saliency will have a positive effect on eco-friendly consumer choice.

### 4.3. Environmental self-identity and self-efficacy

While the goal of our model is to explore the relationship between real-time information disclosure and consumer choice, we argue that a comprehensive model also needs to take into account consumers’ values and behavior regarding environmentally sustainability initiatives. As a result, we include insights from the literature on environmental self-efficacy and self-identity in our model of real-time information disclosure and consumer choice.

Self-identity can be defined as the label used to describe oneself [22], which relates to a particular behavior [21]. Hence, environmental self-identity can be best understood as the extent to which one sees himself/herself as a type of person who acts in an environmentally friendly way. Someone with a strong environmental self-identity will more strongly see himself or herself as the type of person who will act in an environmentally friendly way and will consequently be more likely to utilize information that helps them to act in a pro-environmental manner [61]. It follows that consumers with a strong sense of environmental self-identity will also view the environmental impact of a product as important in their consumer choice.

**P3a:** Environmental self-identity moderates the relationship between the provision of real-time product information and environmental impact knowledge.

**P3b:** Environmental self-identity moderates the relationship between the provision of real-time product information and environmental impact saliency.

Self-efficacy refers to the degree to which an individual feels capable of performing the behaviors that are required to bring about certain desired outcomes [7]. In the context of sustainable development, it covers three dimensions (i.e. environmental preservation, socially fair distribution of resources, and economic welfare), and secondly, consumers’ perceived influence on these outcomes through everyday behaviors in general and consumption in particular [28]. Research indicates that even when a consumer desires to purchase ethical products, he might not be able to find an ethical product, decide among sustainable product choices, or pay ethical product premiums [3,17]. In several studies, consumers reported that they do not purchase ethically sourced products because they do not believe that their actions will make a difference on climate change, animal welfare, or working conditions [6,16,17,29]. When consumers have low environmental self-efficacy, they will be less likely to make eco-friendly choices. Given the important role that environmental self-efficacy is expected to play in terms of influencing consumer choice, we propose a moderating relationship in our model.

**P4a:** Environmental self-efficacy moderates the relationship between environmental impact knowledge and eco-friendly consumer choice.

**P4b:** Environmental self-efficacy moderates the relationship between environmental impact saliency and eco-friendly consumer choice.

### 5. Implications

**For research.** This research provides insight into ways in which real-time environmental information will affect consumer decision-making. A body of research is developing that considers the impact of information feedback on consumers. In the context of environmental studies, such research is considering the utility consumption behavior of consumers, for example, [37], [19], [50], and how feedback on the environmental impact of energy consumption can change individuals’ energy consumption goals and behaviors. These studies use feedback from the past consumption of the consumers and then aim to alter future consumption behaviors. Our work introduces the possibility of influencing current behavior by providing information as consumer choices are being made. While it is known that real-time information along supply chains increases supply chain efficiency, reduces inventory costs, and enables rapid response to unexpected events, the effects of extending real-time product information to consumers are not yet known. Moreover, most of the movements designed to elicit ethical information on production are focused on forcing companies to be transparent and monitor their own suppliers rather than to supply consumers with the information to enable them to make ethical consumer choices. For consumers to take responsibility for the environmental impact of their consumer choices, they must be provided environmental impact information; the closer to the
point of purchase the information, the higher the potential impact.

**For practice and policy-making.** Understanding the benefits of real-time product item level information on consumer choices will provide valuable knowledge to retailers and policy makers. As more consumers move from a “value for money” to a “values for money” mentality, retailers will increasingly be pressured to provide information on the ethical and environmental aspects of products and production such that consumers can make choices consistent with their values [20,34]. Our research helps inform retailers on the ways they can use PTS to educate consumers about the ethical attributes of the products they purchase. Ultimately, retailers and society benefit if consumers are convinced of the value of paying for products that were developed using sustainable production methods [45].

Our work also has implications for environmental policies. We know that individuals who are self-focused will respond better to information that emphasizes the personal benefits of sustainable consumption behavior, and that individuals holding certain values, such as biospheric values, will make more pro-social choices [61], but how can we convince individuals who do not currently identify with environmentalism or sustainability and who will not stand to benefit financially from sustainable consumer choices of the benefits of sustainable consumption? Can information itself alter individual's perspective and values, such that self-focused individuals can see beyond their personal cost of sustainable behavior to collective benefit? If so, then traceability requirements might need to extend to the consumer rather than currently stopping with the retailer.

**For society.** Encouraging people to engage in environmentally sustainable behaviors is an important challenge facing society [48]. The United Nations organization recognizes sustainable consumption as an important means for combating poverty, reducing CO2 emissions, and ensuring fair trade and the just distribution of resources [1]. In order to promote sustainable consumption behaviors, it is important to impart knowledge of sustainable consumption to consumers. Media and grass-roots campaigns may be very helpful, but also needed are individual-level technologies at the hands of consumers. This research contributes to the goal of sustainable consumption and production by exploring the ways in which PTS can inform consumers about environmental and social impacts of the products they purchase, which will then influence consumers to purchase eco-friendly products. When consumers reward companies by purchasing their socially conscious products, firms have incentive to invest in creating eco-friendly products to meet consumer demand. In the end, society benefits when products are produced in a way that preserves our resources so that future generations will have the resources they need to survive.

6. Conclusion

Our research explores the ways in which PTS, when extended to the consumer, encourage eco-friendly consumer choices. The role of information systems has largely been ignored in research on engaging consumers in sustainable consumption. Individuals cannot intentionally and regularly consume ethically unless they are provided with information on the environmental and social impact of a product. This research highlights the unique role of PTS in informing consumers about the ethical attributes of products. PTS have the ability to capture ethical information on a product as it works its way through the supply chain. When this information is communicated to the consumer, they have the information needed to assess how their consumption choice will impact society. Our model of real-time information and eco-friendly consumer choice demonstrates how ethical attribute information will influence consumption choices.

We cannot achieve sustainable consumption and production without the involvement of all stakeholders, including individuals [25]. The majority of research on sustainable consumption and production focuses on the role of businesses in protecting our natural resources [37,54]. This paper focuses instead on ways to engage the individual consumer in sustainable consumption. Protecting our natural resources is a major challenge facing society and providing consumers with the information they need to make sustainable choices is one way in which consumers can respond to that challenge and make a difference.

Future research should focus on testing our model of real-time information and eco-friendly consumer choice in order to gain a full understanding of the effect of ethical attribute information on consumer choice. Informing consumers of the social and environmental impact of the products they purchase is only a first step in encouraging eco-friendly consumer choice. The information provisioned by PTS might cause information overload for some consumers. As such, future research should consider what content, and how much information, should be included in PTS. Moreover, it is unclear which particular features of PTS are most effective in helping consumers choose among products when several eco-friendly options are available. Research inquiring into ways that PTS act as a decision aid will increase our understanding of how
we can use PTS to encourage eco-friendly consumer choice.

The focus of our research has been on information provided to the consumer about the history of a product. However, PTS have the potential to continue to communicate with consumers after they have purchased a product. For example, PTS might provide information on how to minimize any negative impacts of consuming a product by sharing ways to dispose of the item in an environmentally friendly way. The amount of solid waste we produce continues to rise and is expected to reach 2.2 billion tons per year by 2025 [32]. Moreover, managing and disposing of this waste is estimated to have a global annual cost of $375 billion. Future research should focus on ways in which PTS can be used to encourage eco-friendly behavior, such as recycling, even after a product has been purchased.

7. References


[47] Nielsen. Global Consumers are Willing to Put Their Money Where Their Heart is When it Comes to Goods and Services from Companies Committed to Social


