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NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

**NIST Technical Note**
**NIST TN 2368**

# Product Differentiation and Consumer Preferences for Non-market Product Attributes: A Literature Review

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March 2026




U.S. Department of Commerce
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National Institute of Standards and Technology
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NIST TN 2368
March 2026

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**Publication History**
Approved by the NIST Editorial Review Board on 2026-03-16

**How to Cite this NIST Technical Series Publication**
Crowther I, Gore C, Butry D. (2026) Product Differentiation and Consumer Preferences for Non-market Product Attributes: A Literature Review. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Technical Note (TN) NIST TN 2368. https://doi.org/10.6028/NIST.TN.2368

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## Abstract

Understanding consumer perspectives and preferences for attributes embedded in products that are difficult for consumers to identify without additional information, such as included on product labeling or marketing materials, allows producers to better tailor communication messaging leading to more efficient markets. The ability to understand consumer preferences for unobservable attributes often depends on product labeling, certification, and traceability to increase the consumer confidence in claims about the attributes of a product. This report details the literature on each of these components that impact a consumer's willingness to pay for products that lead to increased circularity. Resource utilization and efficiency are an important part of creating a circular economy, which focuses on keeping every molecule of productive capacity in the economy and eliminating waste. This literature review focuses on many product categories that have attributes that are difficult to distinguish such as the origin of materials used for production.

## Keywords

Labeling; certification; consumer preferences; traceability; circular economy

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**Acknowledgments**

We are very grateful for Michelle Seitz, Joshua Kneifel, and Jason Averill for their valuable feedback and comments.

## 1. Introduction

In an efficient market economy, product alternatives and substitutes are abundant. Producers have an incentive to respond to consumer preferences and market demands, resulting in the creation of new goods and services. There is increasing consumer and business interest in differentiating products based on non-observable attributes or in providing non-market benefits. These are products that cannot be easily distinguished from competitors via direct consumer observation. For example, an organic apple is not easily distinguished from other apples, a shirt produced from recycled fibers may be indistinguishable from one produced with virgin fibers, and products produced in a specific country may not be distinguishable. Circular products – e.g. products that increase retention of materials in the economy via mechanisms such as incorporation of recycled materials in their production or design to enable multiple use lifetimes or to facilitate recycling – are one class of goods. Factors driving interest in such goods and products include changing societal preferences among different consumer segments, changing regulatory environment, and evolving supply chains including shifts toward domestic production.

Currently, the American economy functions in a form that is primarily unidirectional. Materials are extracted from the environment, manufactured into products, used, and then discarded. This system leads to resource inefficiency, as resources are removed from the economy and unable to be reused in any capacity. A circular economy, that produces circular products, works to provide more resource efficient and economically sustainable markets while minimizing resource consumption and unnecessary waste [1]. As stated by Kircherr et al. “the circular economy (CE) is a regenerative economic system which necessitated a paradigm shift to replace the ‘end of life’ concept without reducing, alternatively reusing, recycling, and recovering materials throughout the supply chain” [2]. A circular economy allows for natural resources to be non-declining and preserves the ability to reuse finite resources for future means of production. By shifting from a traditional unidirectional production and distribution model to a more circular model, industries and businesses alike can increase their long-term resilience, generating business and economic opportunities through improved resource utilization. Since consumers are unable to distinguish between unidirectionally produced and circularly produced products, the production process is a non-observable attribute. Products differentiated by non-observable attributes or non-market benefits rely on labeling to signal differentiation to the consumer and thus to impact their valuation. Opportunities exist for manufacturers to participate in product differentiation facilitated through labeling claims informing customers of these product characteristics.

This literature review covers an extensive range of products that can be characterized by attributes that depend on labeling claims, and the relationship between these goods and consumer willingness to pay. This literature review attempts to establish how the implementation of product information through labeling, certification, verification, and traceability affects consumer purchasing behavior and willingness to pay for products. The products covered include goods with low resource utilization, goods enabling increased

circularity, goods classified by their country of origin, goods in support of a particular lifestyle, and goods that possess additional information on additives and/or hazards.

### 1.1. Product Differentiation and Consumer Demand

This report reviews the literature related to the value of and consumer preferences for product differentiators that are similar to found with circular goods (e.g., increased material efficiency). While the literature on circular attributes of some industries targeting more circular products (e.g., plastics) is narrow, the willingness to pay and labeling needs for product differentiation in other products can help inform future research on recycling in these evolving industries. To differentiate a product within the marketplace, manufacturers "need to be able to make legally binding claims of product characteristics" [3]. In some cases, these claims and characteristics must be clearly interpretable, accurate, and verified for them to be trusted by consumers, but in other cases lesser forms of assurances are found to be adequate and it tends to be dependent on the type of product offered With stricter forms of assurances, accepted and cohesive rules for tracking manufacturing inputs from recycled content may also be preferred by consumers to validate labeling claims.

Understanding consumer willingness to pay (WTP) for circular products—i.e., products made from recycled materials or whose design allows them to be reused or recycled—provides valuable insights for manufacturers, sellers, and researchers, shedding light on market dynamics and consumer behavior. A positive WTP suggests a market opportunity for circular products, particularly when the WTP exceeds the current market price of non-circular alternative (i.e., price premium). This report summarizes the literature, exploring the factors that directly and indirectly influence consumers' WTP for circular goods, with a focus to emphasize how these factors promote or discourage market acceptance and uptake. Thomas et al. discusses consumer preferences for circular products at length, introducing a discussion on consumer WTP specifically for plastic products. They expand on this discussion by providing an extensive literature review that focuses on "messaging, labeling content, certification structure, and certifying entity" [4]. This report expands on their discussion. There is evidence in the literature demonstrating a willingness in the market to support circular products when they offer to consumers intangible, non-market benefits (e.g., recyclability). This holds even in scenarios where production costs put circular products at a price disadvantage to non-circular goods (e.g., a circular option may garner a price premium that exceeds the increased production cost).

A producer's decision to purchase and use recycled input material is based on a variety of relative impacts and profitability. These include input and manufacturing costs, supply chain risks, and revenue implications. As stated by Thomas et al., using recycled material may also incur additional costs for some applications [4]. In these cases where additional costs or even risks exist, a producer would need to price an item higher to maintain the same level of probability when adjusted for the increase in production cost or risks associated with production. Pricing goods with additional circular-attributes at a higher price point is possible if consumers have a positive WTP for circular-attributes for that specific product. According to

Thomas et al., creating higher consumer WTP for products that possess non-market benefits consists of two main factors [4]. Consumers must be able to accurately identify different characteristics between two products, and they must place a positive value on those characteristics. However, Thomas et al. also acknowledges that WTP does vary on both a product-to-product and consumer-to-consumer level, with individuals placing varying degrees of importance on different product groups and personal values [4].

A variety of factors influence consumers' WTP for circular goods, with consumer trust, recognition, and perceived risk emerging as the most significant components. This literature review explores various elements that impact the decision-making process with respect to the products differentiated on resource sourcing (e.g. incorporation of recycled materials) or end-of-life options (e.g. ability of product to be recycled or reused). These elements include consumer preferences, labeling, certification, traceability, and verification. Within this literature review, we explore the central components that affect consumers' WTP for circular products More research is needed to better understand consumer WTP for differentiated products based on recyclability and recycled content as well as the production processes used in manufacturing recycled content.

Section 2 of the report introduces the WTP literature, highlighting a demand for circular products that have similar non-market value considerations. After exploring willingness to pay, Section 3.1 highlights the importance of information in consumer decision making. By informing consumers on the attributes that products possess, it is discussed how they can make more complete purchasing decisions and understand how their purchasing habits can promote resource efficiency within the economy. Section 3.2 explores elements of successful certification methods, with traceability and verification being identified as the two key qualities. The findings show that traceability and verification boost product labeling reliability and accuracy, attributes that are important to consumers while making purchasing decisions. Section 4 of the report provides an overview of some general barriers that are currently present within decision making for circular products. Findings show that to increase acceptance of circular products in the marketplace, producers must address factors of perceived risk, lack of trust in product claims, and insufficient consumer knowledge. The report advances the literature by suggesting that standardization to support product and material claims, through enhanced labels and product certification and verification, can increase consumer confidence in purchasing decisions, leading to greater adoption and market acceptance of circular products.

## 2. Willingness to Pay

This section of the report reviews the literature on consumer willingness to pay for circular products and highlights other products with similar, production characteristics (e.g., organic and sustainable products). It is demonstrated that there is a positive willingness to pay for product attributes that are aligned with circularity. Even in cases where increased costs place circular products at a price disadvantage to non-circular goods, consumers are often willing to pay a price premium. The findings show that it is typically the presence of non-market benefits, such as perceived improvements to personal and environmental health, that motivate buyers to purchase circular products despite them frequently containing a price premium. When considering consumer willingness to pay for circular products, it is also necessary to evaluate purchase intentions and preferences, in addition to observed market behavior (i.e., actual transactions). This provides a broader perspective on the key factors that affect consumer decision-making behaviors for circular products. This section focuses on organic, recycled, reused, and second-hand products, which are prevalent in the literature. While organically produced and sustainable items are not necessarily circular products, they are included due to their relative market maturity, similarity in labeling and certification concerns, and how consumer preferences are evaluated.

### 2.1. Drivers of Willingness to Pay

Several papers employ the use of theoretical models to assess WTP in relation to circular products. Fu et al. conducted a meta-analysis, integrating the theory of planned behavior with individual perceived risk, environmental concern, social value, and product knowledge to develop a comprehensive model for assessing consumer WTP for circular products [5]. Within the context of this paper and beyond, the theory of planned behavior highlights that consumer attitudes play a significant role in shaping individuals' WTP. Therefore, the authors propose that their findings should align with this insight, indicating that consumer attitudes will influence individuals' willingness to pay for circular products. Previous research also consistently shows that consumers are willing to pay higher prices for products with a perceived positive environmental impact, another insight that Fu et al. sought to confirm through their meta-analysis. Fu et al. find that perceived behavioral control (i.e., that their actions have an impact) had the strongest positive impact on consumers' WTP for circular products [5]. This was followed by consumer attitudes and subjective norms. As suggested by prior research, environmental concern and social value both had a significant positive impact on consumer attitudes. Higher perceived risk was seen to diminish positive attitudes towards circular products; however, Fu et al. suggest that this negative effect could be alleviated by enhancing consumers' knowledge about the products.

Fu et al. review and compare six key theoretical models to analyze consumers' WTP for circular products. These include: the Theory of Reasoned Action, the Theory of Planned Behavior, the Theory of Perceived Risk, the Theory of Perceived Value, the Norm Activation Theory, and the Theory of Consumption Values [6]. Within this set, the Theory of Consumption Values was seen to have the strongest explanatory power [6]. The authors also identify key

factors that are seen to influence the explanatory power of the theoretical models. These include attitude, perceived risk, price, and quality. The findings of the paper reveal a strong positive correlation between attitude, consumer personal norms, and WTP for circular products.

Hein examines the specific factors that influence consumers' decision-making process when choosing to purchase recycled products. This is done through the lens of Value-Belief-Norm theory [7]. The authors incorporate perceived risk in the model as a moderating variable, acknowledging, like Fu et al., its potential to diminish purchase intentions [5–7]. Based on Value-Belief-Norm theory, the author finds that one's moral obligation to contribute to the protection of the environment can outweigh their own self-interest, encouraging them to purchase recycled products despite perceived risks [7].

### 2.2. WTP and Organic Foods and Beverages

Krystallis and Chryssohoidis examine Greek consumers' willingness to pay for organic foods, specifically exploring the factors that affect consumer purchasing behavior for these goods [8]. The authors identify that organic food purchasing decisions are generally attributed to the environmental and safety concerns of the individual consumer [8]. These concerns ultimately drive demand for organic products and influence the price premiums that consumers are willing to pay. The findings suggest that the factors of quality and trust most significantly drive consumers' willingness to pay for organic food. Sogari et al. expand on the ideas of Krystallis and Chryssohoidis but specifically focus on sustainable wine.

They examine consumers' perspectives on sustainable wine based on three major factors—beliefs about environmental protection, beliefs about sustainable wine certification, and attitudes toward sustainably labelled wine. The authors identify a major knowledge problem within their survey results, noting that while consumers generally appreciate the idea of sustainable winemaking, they possess minimal knowledge about it. This lack of knowledge is a common theme within the market for sustainable goods. Many individuals do not inherently understand how sustainable goods are produced, or what makes a good sustainable. The authors showed that consumers with positive attitudes towards sustainable wine, as well as those with strong beliefs in environmental protection, showed higher levels of WTP. Sogari et al. identified four different types of consumers: well-disposed, not-interested, skeptical, and adverse [9]. These findings suggest that companies adopting sustainability programs could benefit if they accurately target the correct demographic of consumers who value sustainable claims on labels. By understanding the concerns that shape consumers decision-making, this information can be used to address trust issues from consumers surrounding organic food, wine, and across other sustainable product categories.

### 2.3. WTP and Second-Hand Goods, Recyclable Products, and Goods Made from Recycled Materials.

The literature on consumer willingness to pay for second-hand goods and those made from recycled materials explores the factors that influence purchasing decisions. While consumers

have been shown to exhibit a higher willingness to pay for products made from recycled materials when given accurate and reliable information, second-hand goods often face greater acceptance [10]. This is typically due to concerns surrounding perceived risk from prior use. Research within this literature review examines how environmental awareness, product type, and informational interventions impact consumer preferences, shedding light on the challenges and opportunities in promoting circular consumption.

Cao and Xu assess how packaging and societal signals can influence consumers' WTP for recyclable or second-hand items, specifically looking at the environmental impact of green parcel packaging [11]. They also examine the impact of signals, such as infographics, on consumer attitudes toward environmental products. Pretner et al. expand on consumer WTP in the circular economy, by comparing new garments made from virgin fibers, second-hand garments, and new garments made from recycled fibers [10]. Their findings reveal that willingness to pay for second-hand products is significantly lower than for products made from recycled fibers, with both falling below consumer WTP for conventional garments. The study also shows that providing consumers with environmental information about how the product positively increases awareness of sustainability issues and enhances their perception of how their purchasing decisions contribute to environmental efforts [10]. By analyzing consumer preferences for second-hand hoodies or those made from recycled fibers, the authors confirm that while circular products appeal to some buyers, their perceived value remains lower than that of new items. Additionally, individuals with higher environmental concern demonstrated greater WTP, highlighting the role of personal values in purchasing behavior.

Testa et al. explore the relationship between key factors such as recycled materials, brand loyalty, and concerns about plastic to better understand their influence on consumer behavior [12]. In their study, they compare a backpack made from recycled material to one made from primary-sourced material, as well as branded versus non-branded options. Their findings show that both the use of recycled materials and plastic concern significantly influence consumers’ attitudes toward the product and its perceived value, ultimately shaping their purchasing decisions. Interestingly, the study found that brand loyalty had little impact on consumers’ choices, which contradicts findings from other research that suggest brand can play a more significant role in purchase behavior.

Harms and Linton examine consumer willingness to pay for refurbished products, including cameras, cell phones, printers, toner cartridges, and auto tires [13]. Their findings reveal that WTP is lower for refurbished products than primary-source products, however they find that accurate eco-certification labels can help raise WTP for refurbished products. They discovered that environmental attributes are also associated with higher WTP, but consumer attitudes toward recycling did not make a significant difference. This result was unexpected but could potentially be due to the fact that consumers do not view recycling and re-using of products to be equivalent.

Sustainability and disposal concerns play a significant role in purchasing decisions, as buyers are becoming increasingly interested in prioritizing packaging materials that minimize environmental impact and align with long-term waste reduction goals. Orset et al. examine French consumer perceptions of plastic water bottles, focusing on their willingness to pay for

bottles made from different materials (recycled, recyclable, or biodegradable) with varying levels of environmental impact. The study finds that consumers are willing to pay a premium for recyclable plastic and biodegradable bioplastic packaging [14]. Additionally, the results highlight the strong influence of informational messages, as respondents who prioritized environmental protection demonstrated a higher WTP for recycled polyethylene terephthalate (r-PET) and other recycled materials. These findings underscore the role of consumer awareness and values in shaping preferences for sustainable packaging.

Klaiman et al. assess consumer willingness to pay for beverage product packaging materials and recyclability, focusing on fruit drink containers. Their findings indicate that consumers exhibit the highest WTP for plastic packaging, followed by glass, carton, and aluminum [15]. The study also highlights the impact of social desirability bias, as WTP values for packaging recyclability were 60 % lower when obtained through indirect questioning compared to direct questioning. Additionally, a video treatment positively influenced WTP, increasing it by an average of 24 %, compared to the average price present in the control group. Overall, respondents demonstrated a positive preference for both recyclability and specific packaging materials, underscoring the complex factors that shape consumer purchasing decisions.

Yamaguchi and Takeuchi evaluate consumers' willingness to pay for products with reduced packaging in Japan, specifically examining whether unit-based pricing policies for waste disposal can influence purchasing behavior [16]. Using a case study comparing a plastic shampoo bottle to a refill pack, they investigate whether stricter waste pricing policies encourage consumers to opt for products with less packaging. Their findings show that individuals living in municipalities with unit-based pricing policies exhibit a higher WTP for reduced-packaging products. However overall consumer WTP for less packaging remains low, with many choosing refill packs primarily for their lower price rather than for environmental reasons.

Park et al. assess the public's willingness to pay a premium for uni-material beverage containers (UBCs) in Korea, using bottled mineral water packaged in PET containers as a case study [17]. Uni-material beverage containers enhance recyclability but come with higher production costs while offering no functional difference to the consumer. Findings from the report show that consumers were willing to pay an additional KRW 107 (0.09 USD) for UBCs. This reflects a 10.7 % premium over the price of non-UBC mineral water, reflecting the public value of UBCs and their contribution to sustainability.

### 2.4. WTP and Country-of-Origin (COO)

As stated previously, it is typically the presence of non-market benefits, such as perceived improvements to personal and environmental health, that currently motivates buyers to purchase circular products. Consumer motivation can also be influenced by other characteristics related to supply chains. A product group that the literature has defined as offering perceived improvements to consumers is those that include Country-of-Origin (COO) labeling. Products that contain information on their country of origin are frequently seen as more desirable, particularly when domestic goods are presented to domestic consumers [18].

COO labeling has been seen to affect consumer willingness to pay. This section explores that relationship and the literature spanning it.

The literature expands on how COO labeling can have both a positive and negative impact on consumer purchasing behavior and willingness to pay, depending on the characteristics of the labeling. Consumers in the United States are particularly concerned with products that are labeled with domestic COO labeling, highlighting the potential incentive for producers to push and maintain products that are "Made in America." While a positive correlation is observed for domestic labeling, a negative correlation is also observed for products with COO labeling from foreign developing nations. This relationship is explored further within the existing literature.

Koschate-Fischer at al. utilize equity theory and cue utilization theory to determine whether a brand's COO affects its consumer willingness to pay [19]. They consider actual brands from a variety of countries to investigate the effects of COO labeling for highly familiar and less familiar brands, while determining the extent to which consumer brand familiarity moderates this relationship. Findings from the paper demonstrate that consumers prefer branded products from a country of origin that has a favorable country image [19]. They are seen to place a higher value on these products and are willing to spend a premium to obtain them. Koschate-Fischer et al. highlight the importance of COO labels as a consumer behavior cue, a notion that is echoed by other authors within the literature.

Loureiro and Umberger assess consumer willingness to pay for a mandatory COO labeling program in three different Colorado cities. Results from the paper show that consumers are increasingly concerned with source verification and product labeling [20]. Consumers are consequently observed to be willing to pay a premium for a mandatory COO labeling program, which is consistent with their personal concerns surrounding verification and labeling. More specifically, survey respondents were willing to pay a 38.3 % premium for steak and a 58.3 % premium for hamburgers that possessed *U.S. Certified Beef* labeling [20]. This information supports that American consumers place value on products that they can confirm are made in America, which could be driven by many factors including supporting local farmer or safety related beliefs.

Yeh and Hirsch conduct a meta-regression to examine consumers' WTP for COO labeling concluding that a significant positive premium exists. They expand on the research presented in other papers within this area of literature and attempt to identify the specific factors that influence estimated consumer WTP for COO labels [18]. The authors determine that the region and product analyzed, along with the design and characteristics of the choice experiment have a significant influence on the magnitude of WTP effects. More noticeably, Yeh and Hirsch observe significant differences in price premiums between domestic and foreign COO labels. Findings demonstrate that consumers' WTP is an average of 31 percentage points higher when a product is labeled with domestic COO information rather than foreign COO information [18]. An even larger discrepancy is seen when the COO is that of a foreign developing country (rather

than a developed one). Consumer WTP is 65 percentage points lower when the COO label refers to a foreign developing country compared to a generic COO label.

## 2.5. WTP and Additives and Hazards in Food and Cosmetics

Products that are perceived to provide human health benefits represent another product category in which consumers perceive improvements, typically resulting in a positive effect on WTP. These products tend to be free of additives, have minimal to zero carcinogens, or provide additional benefits like sustainable or eco-friendly production methods. The existing literature classifies goods with human health benefits into two main categories: personal care products (i.e., cosmetics, shampoos, detergents) and food and beverage products (i.e., meat raised without antibiotics, orange juice with no additives).

Within the realm of personal care products, much of the literature focuses on what is labeled as "green cosmetics." However, the definition of "green cosmetics" varies across studies. In some cases, it refers to products manufactured using sustainable, eco-friendly practices; in others, it describes cosmetics formulated with plant-based or natural ingredients. Often, green cosmetics encompass both of these features. Broadly, they are products designed to minimize environmental impact through the use of renewable ingredients and responsible production methods, while also aiming to be safe and non-toxic for consumers. The literature consistently shows that consumers are often willing to pay a premium for personal care products labeled as green or eco-friendly. The second category discussed in the literature includes food and beverage products that contain minimal to zero carcinogens and artificial additives. The literature suggests that when consumers are made aware of the presence of such additives, it can significantly influence their preferences and purchasing behavior.

Joung et al. investigate consumers' willingness to pay a premium for eco-friendly cosmetics while determining the factors that specifically influence this relationship. The authors measure WTP across four different groups of eco-friendly cosmetics, spanning low- and high-priced makeup and low- and high-priced skin care [21]. Results from the paper conclude that consumers are WTP a premium for all four groups of eco-friendly cosmetics, however the magnitude of premium varies based on the group. Low-priced skin care and makeup produced the highest WTP premiums, followed by high priced skin care and makeup. These results indicate that consumers tend to consider both the price of the good and its attributes when making purchasing decisions for eco-friendly products.

Delistavrou and Tilikidou examine consumer purchase intentions and WTP for cosmetics and detergents, with a specific focus on innovative green products that use eco-friendly chemicals derived from recycled $CO_2$, solar energy, and water. Their findings show that perceived behavioral control was the strongest predictor of purchasing intention, followed by subjective norms and consumer attitudes [22]. Similarly, Puspasari et al. investigate consumers' WTP a premium for green cosmetics, but do so through a study conducted in Malang, Indonesia. Although Puspasari et al. explore WTP for green cosmetics, they do so based on a sample of current or likely users. The demographic of the survey likely accounts for the large

premiums that individuals are willing to pay for each of the products surveyed (30 % premium for serum, 23 % for facial wash, and 37 % for sunscreen) [23].

Food additives and hazards, particularly when consumers are aware of their presence, have the capability to alter purchasing decisions. Several pieces of literature explore this. Harkness and Areal take the concept of consumer willingness to pay and apply it specifically to acrylamide content in baby food. The authors employ a discrete choice experiment composed of a variety of levels for seven different attributes. The attributes include packaging, production method, acrylamide level, sugar, salt, one of five portions of fruit and vegetable per day, and price [24]. Results demonstrate that the attribute of low acrylamide content had the largest impact on WTP, with consumers willing to pay a 105 % premium [24].

Zhong et al. examine consumer willingness to accept and pay for food additives. They conduct a random n-th price auction, comparing orange juice without additives to orange juice with additives. They attempt to determine if consumers existing risk perception, along with additional information on additives, effects their willingness to accept food additives [25]. Findings from the paper show that the variables of age, education, income, satisfaction of food safety, and knowledge of food additives are the main factors that affect consumers' willingness to accept additives (when there is no information treatment present). Zhong et al. also identify that consumer placed more weight on negative information on orange-juice additives than positive information, a finding that is consistent with prospect theory [25].

Radam et al. focus their research specially on the additive of monosodium glutamate (MSG), exploring consumer perceptions, attitudes, and willingness to pay for food products that possess "No Added MSG" labeling [26]. The authors employed the CV method to the results of a 200-respondent survey to determine consumers' WTP for "No Added MSG" beef. Results from the paper indicate that the demand and consumption of products with "No Added MSG" labeling is high and increasing, indicating that individuals are concerned about the additives that are present in their food products [26].

# 3. Conveying Information and Consumer Trust

## 3.1. Labeling

Labels allow sellers to provide buyers with relevant, accurate, and meaningful information to help convey non-market benefits, including information about unobservable attributes, related to their products, which has been used to for human and environmental health considerations. By labeling products in a way that is accurate and easy for the consumer to understand, they are able to incorporate information present on the labels into their purchasing decisions [27]. Labeling is used in many forms on products and can include labels that are backed with certifications, which are discussed in the next section.

### 3.1.1. Types of Labels

One major form of labels that can frequently be found on circular products are eco-labels. Eco-labels are voluntary standards that require verification and certification. These labels play a critical role in promoting sustainability by providing consumers with clear, reliable information about the environmental impact of products and services. Since consumers are typically unable to verify environmental attributes directly, they rely on eco-claims and authenticity labels to convey such information [27]. These labels certify that a product meets specific ecological standards, such as reduced carbon emissions, energy efficiency, or the use of recycled materials, enabling consumers to make informed, environmentally conscious purchasing decisions. Eco-labels bridge the information gap between producers and consumers, acting as a powerful tool to promote accountability and trust.

Aside from eco-labels, the literature also highlights the value of different types of sustainable labeling regarding organic foods and beverages, electronics, and product packaging. Some of these labels include government certifications, private certifications, generic organic labels, and country specific labels [28].

The literature demonstrates that sustainability claims and labeling have an impact on consumer preferences and willingness to pay. Van Loo et al. further justify this claim by comparing attributes relating to consumer valuation and sustainability labels on chicken breasts [29]. These attributes included an organic label, an EU animal welfare label, a free-range claim, a carbon footprint label, and price. The model's findings indicate that approximately 19 % of consumers have a positive preference for all of the eight sustainability labels.

### 3.1.2. Label Sponsorship, Design, and Impact

Although eco-labels are an important aspect of maintaining integrity in the circular economy, not all eco-labels are created equal. Some adhere to rigorous guidelines, while others have weaker standards. Because it is often difficult for consumers to distinguish between them, Darnall et al. examine whether the type of sponsorship behind an eco-label can serve as an indicator of its strength. They focus on three categories of sponsors: industry associations, independent entities, and governments [30]. Findings reveal that industry-sponsored eco-labels

tend to have the weakest institutional design while independently sponsored eco-labels have the strongest. Government-sponsored programs fall in between, featuring institutional frameworks that provide moderate credibility. The authors conclude that program sponsorship plays a critical role in conveying the strength of an eco-label to consumers [30]. They determine that sponsorship is likely to be an effective tool in encouraging firms to strive for improved product adoption.

Given the important role of sponsorship in shaping eco-label credibility, it is also crucial to understand how consumers interact with these labels. As mentioned above, consumers rely on eco-claims and authenticity labels to verify sustainable attributes in products, as they cannot directly assess these qualities themselves. Atkinson and Rosenthal take this concept one step further and evaluate those aspect of eco-labels that yield the most positive results in terms of consumer willingness to pay [27]. Their findings suggest that variations in label formats and sources have minimal impact on behavioral outcomes, such as consumers' purchase intentions. However, these label attributes do influence consumer attitudes toward both the product and label source, as well as their trust in the label itself.

Gatti et al. take a different angle and evaluate eco-labels' impact as they pertain to the coffee market [31]. The authors evaluate consumer preferences for coffee, comparing regular coffee with that labeled as organic, pesticide free, shade grown, and a brand name. These differences in information are depicted through variations in product labeling. The authors aim to estimate consumer demand for sustainable attributes in coffee, focusing on identifying which qualities of sustainably produced coffee are most valued by customers [31]. They find that consumer preferences seem to favor consumer health (e.g., pesticide-free products) over large scale biodiversity and sustainability. This aligns with the consensus that individuals tend to prioritize self-interest. Based on this, the authors propose that eco-labels can increase consumer interest by highlighting and implementing strict agrochemical standards, such as pesticide-free practices, while also emphasizing features that support biodiversity. By doing so, coffee sellers are combining health-focused attributes with sustainability efforts and can maximize price premiums.

Grankvist et al. apply these same concepts to the mobile phone market in Europe. They investigate consumer willingness to pay for mobile phones that are labeled with environmental or social (fairtrade) sustainability certifications [32]. They expand their research by exploring potential links between the importance an individual places on their personal values and their willingness to pay more for sustainable mobile phones. Grankvist et al. offer a unique perspective on labeling and willingness to pay by emphasizing the role of personal values in purchasing decisions. Their study highlights how human behavior shapes the choice to buy sustainable products [32] . Their findings reveal that individuals in Norway, Sweden, and Germany are all willing to pay a price premium of 18 %, 18 %, and 12 % respectively [32]. Once again, social labels garnered higher WTP than environmental labels, suggesting that consumers are more inclined to support sustainability when it aligns with their own self-interest.

The impact from labeling has been combined with other factors that are known to affect consumer WTP, such as differences in socio-economic demographics and consumer frequency

of purchase, to assess their role in influencing decisions. Van Loo et al. combine these factors to assess consumers' WTP for organic chicken breasts [33]. Their results indicate that for all buyer types, regardless of demographic or purchase frequency, the USDA branded label outperforms the general organic label for chicken [33]. These results are shown in Table 2. This suggests that consumers are more likely to trust USDA-branded organic products compared to generic labels, likely because they are often perceived as "better-governed" [33].

Castka and Corbett examine the governance and assurance practices that shape label perceptions among experts and the media [34]. Analyzing three large datasets of eco-labels, they evaluate key factors influencing labeling and certification schemes, including consumer awareness, acceptance, behavior change, and overall benefits. Their findings suggest that both experts and the media prioritize "re-assurance" practices, such as independent oversight, to maintain the credibility of eco-labels [34]. Certification schemes that involve multiple external parties tend to be viewed as more well-governed, with verifier accreditation and government oversight playing a key role in establishing trust.

**Table 2. USDA vs Generic Labeling [34]**

| Type of Label | Frequency of Purchase | WTP Premium |
|---|---|---|
| **USDA Organic** | Non-buyer | 26.2 % |
| | Occasional buyer | 97.3 % |
| | Habitual buyer | 244.3 % |
| **General Organic** | Non-buyer | -29.2 % |
| | Occasional buyer | 35.7 % |
| | Habitual buyer | 146.6 % |

Building on the importance of labeling and consumer trust, Van Asselt et al. explore how warning labels on plastic packaging influences consumer valuations, particularly in the context of single-use containers for eggs [35]. The authors perform a choice experiment to assess the effectiveness of three types of warning labels in reducing plastic consumption, which vary by focus: an environmental label, a health label, and a safety label that combines both environmental and health concerns. Their findings indicate that warning labels effectively lower consumers' WTP for both plastic and Styrofoam containers. When analyzing all treatment groups collectively, the presence of plastic warning labels on plastic egg cartons resulted in a significant $1.02 decrease in WTP, and decreased WTP for foam by $0.51 [35]. The study concluded that warning labels substantially reduce WTP across all container types, demonstrating again that health and safety labels having the greatest impact on consumer behavior.

Janssen and Hamm explore the intersection of organic products, labeling, and certification, tying together key themes from previous research. Their study investigates

consumer preferences and WTP for organic apple and eggs, with a particular focus on how different certification logos influence purchasing decisions [28]. They examine four types of labels: the EU organic logo, country specific government certifications, private certifications, and a generic "organic" label. The findings reveal that consumers have little trust in generic organic labeling without certification, leading to lower WTP. In contrast, products bearing certification logos—especially those perceived as trustworthy, well-known, and backed by strict organic standards—were associated with higher WTP. The study highlights the critical role of consumer trust in shaping behavior, with frequent organic buyers demonstrating a consistently higher WTP across all certification types, reinforcing the value they place on authenticity and assurance in organic products.

More broadly, labeling serves as a powerful tool for influencing consumers' willingness to pay, whether positively or negatively. Consumers rely on clear, accurate labels to access information they might not otherwise have, making trust and transparency essential components of effective labeling strategies. The literature suggests that social labels (labels that indicate a health or ethical benefit) generally lead to higher willingness to pay than environmental labels alone, as consumers are more responsive to messaging that highlights personal health benefits [31]. To maximize demand, it has been suggested that sellers could combine labels that emphasize both social and environmental benefits. As labeling plays a critical role in shaping consumer behavior, the next section will explore the broader impact of certification in driving purchasing decisions.

### 3.1.3. Labeling and Country of Origin

Beyond environmental labels, there are a variety of other product labels that also convey non-market benefits while influencing consumer WTP. Product labels that communicate country-of-origin characteristics fall into this category. Accurate country-of-origin labeling translates into accurate information sharing, which in turn can help consumers make more informed purchasing decisions. Findings from the literature indicate that consumers are increasingly concerned with source verification and product labeling [20]. A concern that extends to country-of-origin labeling specifically.

Loureiro and Umberger authored two papers that examine a mandatory country-of-origin labeling program, and the relationship that these programs have with consumer WTP. Both papers determine that consumers are willing to pay a premium for a mandatory COOL program, while also exhibiting exceedingly high levels of WTP for products with U.S. Certified labeling [50,51]. Within their research, Loureiro and Umberger make a unique contribution by extensively exploring the impact of a requirement mandating retailers to provide consumers with COOL at the point of purchase for a variety of ground and whole-muscle cuts of meat, peanuts, and fruits and vegetables [37]. Loureiro and Umberger then evaluate the presence of the regulation on the sales of beef ribeye steaks, chicken breasts, and pork chops labeled with mandatory COO information [37].

Umberger et al. explore consumer WTP for country-of-origin labeling on beef products. Individuals were given a survey outlining their meat-purchasing behavior, knowledge of beef,

and sociodemographic characteristics. Results from the paper indicate that COOL systems do have a positive impact on consumers. Umberger et al. find that the "variables of food safety concerns, preferences for labeling source and origin information, a strong desire to support U.S. producers, and beliefs that U.S. beef was of higher quality" are the main reasons as to why consumers prefer beef labeled with U.S. country of origin information over no labeling at all [36].

**Table 3. Population WTP Preferences for COOL [36]**

| | % of Population |
|---|---|
| **Preference to purchase product with COOL** | 75% |
| **Indifferent preference** | 22% |
| **Preference to purchase unlabeled product** | 3% |

Yeh and Hirsch conduct a meta-regression to examine the impact of country-of-origin labeling on consumer WTP. The authors find that factors such as the region and product analyzed in choice experiments have a significant influence on consumer's WTP and preferences for country-of-origin labels [18]. Yeh and Hirsch also observe significant differences in price premiums observed between domestic and foreign COOLs; a finding that is echoed in several other pieces of literature.

Smith examines the limitations in the United States' country-of-origin labeling definitions (e.g., what percent of intermediate goods used to make a product must be from the United States) [38]. This standard can pose compliance challenges for both manufacturers and sellers. Smith suggests the creation of distinctions in labels for products that contain differing levels of foreign content.

Caven et al. take a different approach to country-of-origin literature and consider the area of embedded systems and software; a largely unexplored domain of literature. The authors elaborate on the finding that a product's country of origin "influences perceptions of quality and value," particularly in traditional products. The authors hypothesize that a digital product's origin may be an important component in building consumer trust as the market evolves in the digital age. Results from the paper determine that the country of origin strongly influences trust and decision-making, particularly when consumers are primed to consider geopolitical risks [39].

Krissof et al. elaborate on the economic rationale behind consumer claims on the effects of mandatory COOL measures in the U.S. market. Under regulations of mandatory COOL, retailers are only able to designate the United States as the country of origin if the food is solely a U.S. product. As production and distribution continues along the supply chain, this tracking process can get complicated as origin information must be accurately maintained and

transferred to ensure efficient labeling [40]. The authors also explore voluntary U.S.COOL measures and see how these measures relate and differ to mandatory programs. They find that voluntary COO labels are rarely present on food products and in retail advertising. Krissof et al. notably observe minimal evidence that the market is not efficiently meeting the preferences of consumers for country-of-origin information and labels [40].

Additional costs from labeling, recordkeeping and operating are absorbed and incorporated into a general equilibrium model to measure the impact of mandatory COOL on purchasing power in the economy. The authors determine that enforcing a mandatory U.S. COO labeling system is not likely to change the quality of U.S. origin products [40]. Results from the model indicate that there is minimal evidence to show that label-conscious consumers represent more than a niche portion of the market.

#### 3.1.4. Labeling and Health and Additives

Grappe et al. investigate the effect of cosmetic products labeled as “not tested on animals” on consumers’ attitude and behavioral intentions. The authors use an enriched version of the Theory of Planned Behavior to explain the “adoption or non-adoption intention of a behavior through the attitude held towards this behavior, perceived behavioral control and subjective norms” [41]. A group of 450 respondents were surveyed with half being placed into a control group and the other half being placed into a treatment group. Results from the paper indicate that both external variables, such as product credibility and personal attitudes toward marketing claims, in combination with internal psychological variables, such as subjective norms and altruistic concerns with animal welfare, influence consumer attitudes towards personal care products with “not tested on animals” labels [41]. While this article surveys consumers outside of the United States, the survey design and elicitation methods are applicable to this report.

Radam et al. look at another form of labeling in the health and additive space by exploring consumer perceptions, attitudes, and WTP for food products with “No Added MSG” labeling [26]. The authors employed the CV method across a close-ended survey of 200 respondents from Malaysia to determine consumers’ WTP for the consumption of safer beef. Results indicate that consumer demand and consumption of products with “No Added MSG” labeling is high and increasing [26].

### 3.2. Certification

While labels play a significant role in shaping consumer preferences and willingness to pay, label certification is another key factor that has been shown to influence WTP. As stated by Jahn et al., certification schemes are used to verify marketing claims for unobservable quality attributes, particularly in scenarios where there is an asymmetry of information between the producer and the consumer [42]. A certification, in respect to product labeling, is a label that is used when the product meets certain standards and/or regulations that have been set by a third-party or government agency. Therefore, all certifications can be considered labels, but not all labels contain certifications.

This section investigates the potential willingness for consumers to pay a premium for certified products or raw materials. The literature explores the effects of certification programs on consumer behavior. The findings reveal that satisfactory certification on labels can help improve consumer trust of goods [42, 43]. There are also three major obstacles identified as to why consumers do not purchase certified goods. These include a lack of awareness of the certification, lack of motivation, and failures to notice eco-friendly labels [42, 43]. By offering an assurance of labeling claims, certification can influence consumer preferences and willingness to pay, as individuals have more certainty on the attributes of a product.

### 3.2.1. Certified Wood

Wood is certified based on the forestry practices that address issues related to deforestation and forest degradation, particularly in tropical regions. This mechanism plays a critical role in promoting accountability and transparency within forest industries. Strong certification methods offer consumers with the confidence that the products they purchase come from responsibly managed forests [43, 44].

Research conducted by authors Aguilar and Vlosky, along with Cai and Aguilar, examine and expand on consumers' WTP for certified wood products in the United States [43, 44]. Aguilar and Vlosky evaluate several different product types to compare certification characteristics across a variety of markets [43]. These products include ready-to-assemble chairs, dining room sets, kitchen remodeling jobs, and new home construction. The authors findings show that the impact of certification sources varies by product type. For instance, industry-based certification had a significant positive effect on new home construction, while private-based certification was more highly valued for dining room furniture and kitchen remodeling projects [43]. Certification by environmental non-governmental organizations (NGOs) also demonstrates a positive influence on consumer preferences for both dining room furniture and kitchen remodeling projects. Despite these results, certification had no apparent effect on consumer preferences for ready-to-assemble chairs. In general, individuals who believe that certification helps reduce deforestation tend to be more willing to pay a premium for certified products [43]. Furthermore, there is a strong positive correlation between household income and one's willingness to pay a premium for such products. This is consistent with other papers in the literature.

Cai and Aguilar expand on Aguilar and Vlosky's research by further exploring consumers' willingness to pay for certified wood products. Through a meta-analysis, they identify and analyze the specific factors that influence consumers' willingness to pay a premium for these products [44]. Cai and Aguilar suggest that environmental certification is more effective at securing higher price premiums for lower-priced, frequently purchased products. Their empirical model shows that as a product's base price increases, consumers' willingness to pay a premium decreases [44]. The study's results reveal several key insights about consumer WTP for environmentally certified products. Additionally, the model shows that consumer WTP for environmentally certified products has grown over time [44].

### 3.2.2. Certified Palm Oil

Another product category that is significantly impacted by the presence of certification is palm oil. Giam et al. and Richartz and Abdulai examine consumers' willingness to pay for sustainably certified palm oil products in Singapore and Germany. Giam et al. specifically analyze product groups that commonly contain palm oil, such as chocolate bars, cookies, margarine, moisturizers, potato chips, and soap [45]. They also examine whether consumers are less likely to purchase a product when informed it was linked to deforestation, rather than simply containing palm oil. The study found minimal consumer bias against palm oil as an ingredient but revealed strong negative perceptions of products associated with deforestation [45]. Consumers expressed a willingness to pay a premium of 8.2 % to 9.9 % for deforestation-free alternatives [45].

Richartz and Abdulai specifically examine sustainable palm oil within the context of chocolate cookies and chocolate spread. These products were selected because sustainability is seen as a key factor directly influencing their purchasing behavior, indicating that people care about the sustainability of palm oil used in such items. Findings from the research reveal that products labeled "organic" yield the highest levels of WTP among customers, making it the most promising attribute for promoting sustainable palm oil [46]. The authors also found that information interventions significantly increase consumers' willingness to pay for sustainability [46]. These findings align with previous research, confirming that when consumers receive reliable, accurate, and easily understandable information about sustainability, they are more likely to incorporate it into their decision-making and purchasing behavior.

### 3.2.3. Certified Coffee

Takahashi et al. and Liu et al. examine the role of certification in the context of coffee, focusing on its main characteristics and overall impact. The papers use varying analyses to identify different components that affect consumer preferences, purchasing behavior, and willingness to pay for certified and organic coffee. Takahashi et al. focus specifically on consumer interest in environmental issues, the provision of information, and product labeling in respect to their influence on consumer purchasing decisions for certified forest coffee [47]. Their research is novel by focusing on participants' actual purchasing behaviors, involving real monetary transactions, rather than relying purely on hypothetical WTP scenarios [47].

A recurring theme, also observed in studies outside of the coffee market, is that consumers often overstate their willingness to pay (WTP) in online surveys compared to in-person settings. This hypothetical bias is exemplified in the findings of Takahashi et al. The report highlights that providing participants with additional information about the forest coffee certification program does not significantly influence their purchasing behavior. However, visual illustrations on product labels increase purchases of certified forest coffee. These results emphasize the importance of effective marketing strategies in driving demand for sustainable coffee and other sustainable goods.

While Takahashi et al. focus on the relationship between information, labeling, and consumer purchasing decisions in the market for certified forest coffee, Liu et al. look beyond the label and into the product's certification attributes. Their research focuses on consumer preferences for organic coffee, specifically analyzing how sustainability-related certification attributes influence demand, attention, and willingness to pay [48]. Liu et al. address gaps in the literature by exploring the connection between consumer environmental consciousness and the impact of environmental concerns on purchasing behavior. The authors construct a "coffee certification attribute utility model" using a choice experiment method to analyze the data collected from respondents [48]. They employ multinomial logit and random parameter logit models to estimate utility functions and analyze preferences across respondents' varying socioeconomic backgrounds. The report produces findings aligned with prior research, showing that traceability and organic certifications are the most valued attributes amongst consumers, while fair trade certification is the least prioritized [48]. Liu et al. also find that consumers prefer coffee products with clear certification markings and traceable sources, reinforcing the idea that consumers value labels and certifications that effectively and transparently communicate information—a recurring theme across multiple papers in this literature review.

### 3.2.4. Certified Rice

Nie et al. investigate the influence of organic certification labels on rice. They evaluate the impact of organic certification labels, from a variety of third-party verification institutions, on consumers' WTP for organic rice in Taiwan [49]. These third-party organizations include foundations, associations, university certification centers, and private businesses. The authors make a point to inform readers about the differences between intrinsic and extrinsic cues to consumers, classifying factors such as taste and ingredients as intrinsic, and factors such as certification labels and packaging as extrinsic. After presenting consumers with various rice packaging sizes available at different price points, they are then asked to indicate their WTP. It is found that third-party certifications not only assist governments in developing and managing organic food markets, but that these certifications also enhance consumer confidence [49]. When intrinsic cues are held constant, consumers demonstrate the highest willingness to pay for organic food certified by foundations and universities, while certification labels from private businesses possess the lowest level of trust [49].

### 3.2.5. Certified Bio-based Products and offsets

The use of certification of products goes beyond food and agriculture and is present in several other markets. These include bio-based consumer products and fuels as well as offset markets. Morone et al. examine consumer purchase intentions for bio-based products in Italy, focusing on colored pens, food storage bags, and bar soap [50]. The products included in evaluation are all certified as sustainable; however, the exact certification source is not revealed. As shown in Table 4, the authors define two distinct pricing premiums from the results of their field experiment: a premium they termed the 'green premium,' which represents the increase in WTP from conventional to bio-based products, and another authors termed, 'certified green premium,' which represents the increase in WTP from bio-based to certified bio-based products

[50]. As shown in the results of Table 4 the demand for conventional products tends to be more elastic than that for bio-based and certified bio-based products across most product categories. Morone et al. determine that individuals' demonstrate support for bio-based and certified bio-based products when they believe these products will benefit both their personal health and the environment [50]. They also conclude that consumers additionally value products made from natural resources.

**Table 4. WTP Levels per Product [50]**

| Product | Conventional WTP | Bio-Based WTP | Certified Bio-Based WTP | Green Premium | Certified Green Premium |
|---|---|---|---|---|---|
| **Colored Pens** | 2.1 euros | 3.1 euros | 3.2 euros | Statistically significant | Not significant ($p = 0.482$) |
| **Food Storage Bags** | 1.4 euros | 2.9 euros | 3.3 euros | Statistically significant | Statistically significant |
| **Hand Soap** | 1.6 euros | 2.5 euros | 3.0 euros | Statistically significant | Statistically significant |

Gracia et al. examine consumers' social preferences and their willingness to pay for certified biofuels in Spain [51]. The authors conduct a questionnaire to capture information on consumer attitudes, knowledge, and preferences regarding biodiesel, focusing on fuel purchasing habits and actual or intended biodiesel consumption. Findings demonstrate that consumers are willing to pay a premium for certified biofuels, with even higher premiums for increased availability at their usual fueling stations. The results identify two distinct consumer groups: "biodiesel seekers" and "convenience seekers." Biodiesel seekers prioritize the environmental benefits of biodiesel and are willing to pay more for certified sustainable options. In contrast, convenience seekers place greater importance on fueling convenience and biodiesel availability at familiar locations. While they are willing to choose biodiesel if it is readily available, they are not inclined to travel outside their regular routes to access it [51]. Overall, the study highlights that environmental certification and accessibility are the two key factors driving consumer adoption of biodiesel.

Mackerron et al. investigate consumer preferences for voluntary carbon offsets, focusing on the impact of certification and co-benefits on willingness to pay [52]. The study found that voluntary offset adoption can be encouraged by investing in projects with co-benefits and effectively communicating these benefits to consumers. Certification is also shown to add value to offsets, potentially justifying higher costs, provided that consumers fully understand its significance. Among the various co-benefits, biodiversity conservation was the most highly valued, while technology and market development ranked the lowest.

## 3.3. Impacts of Verification and Traceability

As demonstrated in Section 3.2, certification plays an important role in the messaging of sustainable goods by conveying information to consumers that they may otherwise unobserved. Third-party verification can have a significant influence on consumer purchases, particularly in cases where there is variation in trust. Darnall and Vazquez-Brust examine this relationship, focusing on how trust and verification shapes consumer behavior and its connection to certification [53]. The pair examine how consumers respond to labels and their sponsorship sources, as well as how differences in certification influence purchasing behavior. The study highlights the major differences amongst labels and how these differences play an instrumental role in consumer decision-making [53]. The study concludes that labels vary in two keyways: the sponsoring organization—whether this be governmental, NGOs, or business associations—and the monitoring and verification process, as some sponsors actively oversee compliance while others do not. In product labeling, verification confirms that a product meets specific requirements or standards, whereas certification provides third-party assurance that those standards are met—typically through a formal process and identifiable label. Verification typically involves internal checks, inspections, and testing to ensure compliance with regulations. There is a strong link identified between consumers' trust in institutions that provide credible information and their reliance on labels when making purchasing decisions [53]. Accurate certification frequently ensures dependable verification, which can enhance consumer trust, ultimately increasing the likelihood that individuals will choose sustainable products with reliable labels.

Traceability refers to the ability of firms or regulatory agencies to monitor a product's origin and movement throughout the supply chain. Robust traceability systems can improve supply chain management by streamlining distribution, enabling product differentiation, and ensuring higher standards of food quality and safety. Zhang et al. explore the concept of traceability in the marketplace. The authors analyze consumers' WTP for traceable food products—specifically pork, milk, and cooking oil—and examine the factors influencing this behavior, with a particular emphasis on the role of consumer knowledge [54]. Their findings demonstrate that consumers are willing to pay a premium for food traceability, though the extent of WTP differs across the three product categories. Providing information on traceability increased respondents willingness to pay a premium by 13 %, 18 %, and 14 % for pork, milk, and cooking oil respectively. Consumer knowledge emerged as a key factor influencing consumer WTP for traceable food products. Providing information about the features of food traceability significantly increases consumers likelihood to purchase traceable foods. The data revealed a strong positive correlation between consumer awareness of food safety and quality certifications and their WTP, a trend that was consistent across pork, milk, and cooking oil.

Smith et al. elaborate on traceability systems that are currently present in the United States food industry. Although the authors do not specifically explore consumer WTP, they provide valuable research into the breadth, depth, and precision of current traceability systems in the U.S., while highlighting the impact that traceability has in the market. The authors highlight that the traceability systems for food in the U.S. currently lag many developed

countries, particularly amongst livestock, poultry, and their subproducts [55]. They found that efficient traceability systems have significant positive economic implications in the areas of animal and human health, international trade, and supply chain dynamics. These systems are seen as needed to minimize product recalls and make crisis management protocols more effective [55].

Accurate verification and traceability methods, whether this be in reference to goods labeled as organic or goods containing country-of-origin labeling, is necessary to provide consumers with sufficient information. For consumers to make the most informed purchasing decisions that best align with their personal preferences, they need to be knowledgeable on products available in the market and their alternatives. The characteristics of verification and traceability convey information to consumers that they may otherwise miss.

## 4. Barriers in the Circular Economy

This section details barriers to WTP in the circular economy that typically stem from factors such as perceived risk, lack of trust in product declaration, and limited or incomplete information available for consumers. Concerns about contamination and diminished product quality can also deter consumers from purchasing recycled or second-hand goods. Limited transparency within supply chains combined with uncertainty surrounding certifications and labels also significantly hinders consumer assurance. These barriers can be addressed through effective communication, education, and comprehensive certification frameworks. The literature demonstrates that by reducing these barriers, willingness to pay is increased.
The literature identifies perceived risk, a personal interpretation of risk based on preconceived notions, as a fundamental factor in influencing consumer willingness to pay and a significant barrier in the circular economy. Perceived risk refers to the expectation that using a product may result in negative outcomes—e.g., a perceived risk with a refurbished item might be lower quality and higher likelihood of product failure. Analyzing consumer attitudes and buying habits through the lens of perceived risk helps suppliers and sellers identify ways to reduce it, increasing purchasing incentives for associated goods. Magnier et al. recognize the value in exploring the impact of perceived risk. They explore consumer responses to products made from recycled ocean plastic, with a particular focus on issue awareness and consumer attitudes. Using the Theory of Perceived Risk alongside a cost-benefit trade-off approach, they identify the perceived risks and benefits that directly influence consumers' willingness to pay [56]. The report identifies key predictors of purchase intentions, including anticipated conscience, value for money, and perceived functionality as positive factors, while the risk of contamination serves as a negative factor. Anticipated conscience refers to the negative emotions or feelings of guilt, shame, or regret that a consumer anticipates experiencing if they do not make a purchase that aligns with their personal values or moral principles.

Polyportis et al. highlight factors that influence consumer preferences and acceptance of products made from recycled materials. They attempt to identify drivers of acceptance, examine potential barriers, and offer recommendations for future action. The authors find that consumer acceptance of recycled products is predominantly shaped by the factors of perceived risk, environmental benefits, perceived quality, safety, risk, emotion, and individual differences. The most notable barrier identified by Polyportis et al. is perceived risk, with concerns about contamination and product quality standing out as major issues for consumers [57]. The authors emphasize the need for further research to identify effective mechanisms for alleviating these perceived risk concerns, fostering greater consumer trust and acceptance of recycled products.

Hamzaoui-Essouossi and Linton examine the premium that consumers are WTP for products containing reused or recycled content, while also investigating the impact of product type on their willingness [58]. They explore a variety of products, including paper, single-use cameras, toner cartridges, tires, auto parts, cell phones, and printer/fax machines. Their findings reveal that perceived functional risk plays a significant role in shaping consumer WTP; a theme that is discussed in many papers throughout this literature review. Products with higher

perceived risks often require greater price discounts compared to their new product counterparts. However, factors such as strong brand reputation and the inclusion of warranties can help mitigate perceived risks, thereby enhancing consumer acceptance and willingness to pay.

Confente et al. also explore the barrier of perceived risk in the circular economy [59]. However, they focus specifically on return policies and how they can help reduce perceived risk for consumers. They apply the Theory of Perceived Risk to data collected through a pre-test and a scenario-based experiment in order to examine how the presence of a return policy, and improved return leniency, influences purchase intentions for remanufactured products. Confente et al. find that return polices help reduce consumers' perceived risk regarding product quality for remanufactured goods, both online and in brick-and-mortar retail settings [59].

Baxter et al. examine another barrier for WTP, contaminated interaction, one of the most significant issues in relation to the circular economy [60]. Contaminated interaction can be classified as "a user-object interaction influenced by past use" [60]. Through a combination of data collected from a variety of literature reviews and case studies, the authors provide valuable insights into this critical challenge. They highlight how consumer decision-making is affected as products transition through the phases of multiple uses and users. These transitions ultimately shape consumer perceptions of value and desirability. Their findings reveal that contaminated interaction creates three significant barriers within the circular economy. These include downcycling, disposal, and hindered circulation. Unfortunately, these barriers create ripple effects that significantly influence consumer purchasing habits. They lead to behaviors such as object avoidance, devaluation, and misuse, all of which impede the efficient circulation of materials within the circular economy.

Baxter et al. also discuss the presence and behavior of closed-loop materials. Closed-loop materials refer to resources that are part of a closed-loop system. These resources are continuously reused and repurposed in a circular process to help minimize negative environmental impact by promoting characteristics such as recyclability, traceability, longevity, and sustainability [60]. Closed-loop materials are particularly vulnerable to contaminated interaction as their perceived value tends to diminish as they move between multiple users. The authors highlight the need for vendors to develop products that are more capable of transitioning amongst a variety of users without negative consequences. By increasing the number of experientially transferable designs within the marketplace, this has been shown to help support a more sustainable circular economy.

## 5. Conclusion

This literature review underscores the important role that information, labeling, certification, and verification play in individuals' willingness to pay for non-market benefits and unobservable product attributes. Findings reveal that consumer trust, recognition, and perceived risk all play a critical role in determining consumer preferences. These are characteristics that producers and researchers alike must consider when developing new standards or best practices for product labeling. Stakeholders can leverage this literature review to inform future labeling, certification, and related standards for circular products which can influence adoption by end users. Informing consumers on the benefits of circular products—through methods of labeling and certification—can help improve product credibility, mitigate perceived risks, and contribute to increasing acceptance and demand for such products. The insights presented in this literature review provide a strong foundation for future research and highlight the importance of the type of information consumers have access to through labeling, certification, verification, and traceability.

One major limitation of this report is that it does not use as systematic approach to collecting literature for this review. This review presents literature across different contexts, so a systematic approach to collecting papers was not utilized. Additionally, each article we include uses different elicitation techniques, which makes comparisons across papers difficult. The goal of this review is to highlight the different methods used and labeling needs to elicit accurate willingness to pay results. There are also a few papers used within this review that survey individuals outside of the United States, so the preferences elicited in those cases should not be used in comparison to preferences for consumers in the United States; however, the methods used within the papers are still relevant for future research study development, so they are included within this review.

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## Appendix A. Annotated Bibliography

**Disclaimer:**

The terminology used within the annotated bibliography is the terminology used within the paper being summarized. The use of specific terminology for non-market attributes is not an endorsement of these ideas by the authors or the National Institute of Standards and Technology.

**Aguilar FX, Vlosky RP (2007) Consumer willingness to pay price premiums for environmentally certified wood products in the U.S. *Forest Policy and Economics* 9(8):1100–1112. https://doi.org/10.1016/j.forpol.2006.12.001**

The authors examine consumers WTP for certified wood products in the U.S., finding evidence that many are willing to pay a premium [43]. They contextualize forest certification as a mechanism designed to address concerns about deforestation and forest degradation, particularly in tropical regions. The study draws on data collected from U.S. residential consumers in 1995 and 2005, enabling a direct comparison of consumer attitudes and market changes over this 10-year period. The 1995 data set contained 274 participants, where the 2005 dataset included 165. By comparing these two years, the authors can determine shifts in consumers' WTP for certified wood products.

The authors use an ordered probit regression model to estimate the WTP premium for four specific certified wood products: ready-to-assemble chairs, dining room sets, kitchen remodeling jobs, and new home construction. The analysis reveals that consumer who believe that certification helps reduce deforestation are generally more willing to pay a premium. Additionally, there is a strong positive correlation between household income and WTP a premium for certified products.

The findings show that the impact of certification sources varies by product type. For new home construction, industry-based certification has a significant positive effect on WTP. Private-based certification shows minor significance for dining room furniture and kitchen remodeling jobs. Certification by environmental NGOs is significantly positive for dining room furniture and minorly significant for kitchen remodeling projects. However, certification plays no role in consumer preferences for ready-to-assemble chairs. Overall, the research demonstrates nuanced consumer preferences and underscores the importance of aligning certification strategies with product types and consumer priorities.

**Atkinson L, Rosenthal S (2014) Signaling the Green Sell: The Influence of Eco-Label Source, Argument Specificity, and Product Involvement on Consumer Trust. *Journal of Advertising* 43(1):33–45. https://doi.org/10.1080/00913367.2013.834803**

Atkinson and Rosenthal's paper shows how consumers are unable to verify "green" attributes directly [27]. Therefore, they must rely on signals such as eco-claims and authenticity

labels. They believe that consumer trust and marketing message credibility are both central to issues of green consumption and green product claims. The authors seek to explore which aspects of said labels yield the most positive results.

The authors survey undergraduate students enrolled in an advertising class at a specific university in the Southwest United States. Screener questions were included in the survey to weed out those who were inattentive. After only including those participants who answered both screeners correctly, the final sample contained 233 participants. The average age of participants was 20 years old with a 77.3 % share being female, a 40 % share being non-white, and the mean family household income ranging from 70 000 to 79 999.

The study employs a 2x2x2 experimental design, which includes three independent variables, each with two levels. This design allows researchers to examine the individual effects of each factor on the dependent variable(s) while also examining how the three factors interact with one another. Table 1 outlines the factor analysis and experimental conditions used by Atkinson and Rosenthal. Participants were randomly assigned to one condition, where they were provided with brief background information about the eco-label and its source. They then viewed a graphic of the eco-label alongside a generic image of the product.

**Table 1. Factor Analysis and Experimental Conditions**

| Factor | Level | Description |
|---|---|---|
| **Argument Specificity** | Specific | This can be manipulated by changing the amount of information contained in the eco-label |
| | General | |
| **Eco-source** | Government | This can be manipulated by describing the label as being issues either by a big box retailer (Target) or by the EPA (government) |
| | Corporate | |
| **Product Involvement** | High | This factor is a bit more abstract. Technologically advanced products like cars and computers are typically seen as higher involvement, whereas fast moving consumer goods like coffee and cereal are ranked as lower involvement |
| | Low | |

Their findings suggest that while different label formats and sources have little influence on behavioral outcomes (such as purchase intent), these labels do influence attitudes toward both the product and label source, as well as trust in the label. Although it is difficult to pinpoint factors that specifically lead to purchase, there are specific combos of message factors and product involvement that can help foster positive evaluations of eco-labels.

**Baxter W, Aurisicchio M, Childs P (2017) Contaminated Interaction: Another Barrier to Circular Material Flows. *Journal of Industrial Ecology* 21(3):507–516. https://doi.org/10.1111/jiec.12612**

Baxter et al. examine the issue of contaminated interaction within the circular economy, a challenge that threatens the integrity and flow of materials in circular systems [60]. The authors define contaminated interaction as a "user-object interaction influenced by past use," which impacts the perceived value of the product. This concept highlights how consumer decision-making is affected as products transition through multiple sues and users, ultimately shaping perceptions of value and desirability.

The report uses a combination of literature reviews and case studies focusing on the topic of contamination. They separate contamination into three different groups that influence the flow of circular materials: technical, systemic, and interaction. These types of contamination can occur independently or simultaneously. Table 2 elaborates on the three different groups of contamination that are classified in the report. Baxter et al. highlight consumer behavior and interactions in three scenarios: reuse, where efforts aim to avoid reducing product circulation; remanufacture, where products may be perceived as having diminished value (a form of downcycling); and recycling, where consumers may choose to discard items instead of recycling them properly.

**Table 2. Types of Contamination in the circular economy**

| Contamination type | Definition | Circular barriers | Areas of occurrence |
|---|---|---|---|
| **Technical** | Presence of contaminant renders material unusable | Disposal, downcycling, hindered material flows | During any point in a material life cycle |
| **Systemic** | Presence of contaminant reduces the efficiency of material flows | Inefficiencies in material flow | During system-level processes |
| **Interaction** | Presence of real, or imagined, contaminant makes the material undesirable for use due to perception of use | Disposal, downcycling, hindered material flow | During any user-object interaction |

The findings reveal that contaminated interaction creates three significant barriers to the circular economy: downcycling, disposal, and hindered circulation. Closed-loop material flows, including raw materials, substances, and products, are particularly vulnerable to contaminated interaction as their perceived value diminishes as they move between multiple users. This phenomenon is seen to cause object avoidance, devaluation, and misuse, all of which impede the efficient circulation of materials. The report highlights the need for developing experientially transferrable designs (products that can transition seamlessly

amongst users without negative consequences) to support a more sustainable circular economy.

**Cai Z, Aguilar FX (2013) Meta-analysis of consumer's willingness-to-pay premiums for certified wood products. *Journal of Forest Economics* 19(1):15–31. https://doi.org/10.1016/j.jfe.2012.06.007**

Cai and Aguilar expand on the pre-existing literature that is estimating consumers' willingness to pay premiums for certified wood products [44]. Estimates of WTP premiums for certified wood products versus uncertified currently range anywhere from 1.0 % to 39.3 % as given by previous literature. The authors seek to determine the key factors that drive consumers' willingness to pay premiums using a meta-analysis of data from 19 different studies conducted globally. Meta-analysis data inherently faces econometric challenges such as study heterogeneity, variable heteroskedasticity, and intra- and inter-study autocorrelation. The authors are also concerned with understanding the large variation in price premium estimates across different studies.

Data was gathered through an electronic search to identify past publications regarding the certified wood product market. Studies selected for the meta-analysis had to meet two standards of selection: WTP must be directly reported by the study, and the studies must focus on final consumers. 19 studies were identified, with a total of 59 observations, as some of the studies included more than one observation. Cai and Aguilar express WTP as a function of respondents' preference elicitation method (M), survey and sample characteristics (S), and attributes of the wood products (A).

Results from the study indicate that environmental certification tends to capture higher price premiums for lower-priced and frequently purchased products. The model results further show that an increase in the base price of a product leads to a decrease in consumers' willingness to pay a premium. Additionally, the model found that consumers' WTP for products with environmental certification has increased over time.

The authors also found that estimates derived from conjoint analysis tend to be highly biased in comparison to those based on contingent valuation (CV) methods. Survey method differences were also observed, with mail and online surveys generally yielding higher reported premiums compared to face-to-face surveys. This suggest that consumers tend to overstate their WTP a higher premium in online surveys relative to in-person interactions.

**Cao C, Xu Q (2023) A new perspective on extra consumer costs for green parcel packaging — An exploration of signal theory and green values. *Journal of Cleaner Production* 382:135361. https://doi.org/10.1016/j.jclepro.2022.135361**

Cao and Xu explore the factors that influence consumers' WTP a premium for "green" express packaging, focusing on the role of signals, such as infographics, and consumer attitudes toward green products [11]. Their study pays particular attention to recycled or second-hand packaging products, providing insights into consumer behavior in the context of sustainable practices.

Drawing on signal theory, the authors analyze how packaging and societal signals influence consumers' decisions. They employ a partial least squares structural equation model to conduct a quantitative analysis. Their research aims to answer two questions: whether consumers are willing to pay more for green express packaging and what factors affect their willingness to pay a premium. The entire lifecycle of green express packaging—encompassing development, manufacturing, use, and recycling—is considered in their analysis.

The study collected data from 400 participants aged 18 to 65, with 56.75 % of participants identifying as female. The sample was robust, as most participants held higher education qualifications, allowing for a thorough analysis of the variables in question. Using a structural model analysis, the study confirms that all four hypotheses based on signal theory pass the significance test.

Key findings revealed that recyclable attributes, government policy guidance, and social norms significantly influenced consumers' WTP for green products. However, the impact of these factors varied with recyclable attributes being negatively correlated with WTP and government policy guidance and social norms being positively correlated. Notably, the influence of signals is stronger among consumers with lower personal values of greenness, whereas individuals with higher greenness values exhibit a greater WTP price premiums for green products.

**Castka P, Corbett CJ (2016) Governance of Eco-Labels: Expert Opinion and Media Coverage. *Journal of Business Ethics* 135(2):309–326. https://doi.org/10.1007/s10551-014-2474-3**

Castka and Corbett explore the governance of eco-labels and the assurance practices that influence their perception as "better-governed" by both experts and the media [34]. Rather than conducting their own qualitative or conceptual experiments, the authors focus on analyzing a large set of eco-labels, gathering data from three different sources. They define eco-labels as voluntary standards that require verification and certification. The study examines the factors that influence eco-labeling and certification schemes, including consumer awareness, consumer acceptance, consumer behavior change, and end benefits. The paper makes several significant contributions, combining literature on voluntary regulation with that from accounting and auditing, applying these perspectives to the growing domain of eco-labels where governance is critical.

The research begins with interviewing leading experts on eco-labels and governance. From these insights, the authors create a dataset of eco-labels, drawing from 336 eco-labels. Of this full set, there are 56 that had sufficient media coverage. After cleaning and merging data, the authors collected information on the governance and assurance practices of each eco-label. They ended up with a dataset of 41 eco-labels to be used for data analysis. The study also incorporates an online survey to gauge expert opinions on the quality of governance in these eco-labels. A team of MBA students then conducted 32 in-depth interviewers with a diverse range of experts from various sectors, including retailers, corporate purchasers, government agencies, consultants, and consumer groups worldwide. The interviews covered topics such as the motivations for firms to pursue certification, the role of governance in eco-label success, challenges with eco-labels, and their future potential.

The authors' hypotheses focus on the quality of governance of eco-labels as perceived by experts and the media. Their findings suggest that both experts and the media prioritize "re-assurance" practices, such as independent oversight, to ensure the credibility and governance of eco-labels. The study reveals that schemes involving multiple external parties are perceived as better governed by both experts and the media.

Experts generally agreed that for an eco-label to be successful and credible, it must attract prospective stakeholders and maintain their trust. The research highlights that while the presence of most assurance practices does not significantly affect experts' perceptions of governance quality, certain factors, such as the accreditation of verifiers and governmental control, are crucial. Governmental oversight and independent accreditation schemes were identified as the key factors that enhance consumer trust.

The media on the other hand, appear to be more concerned with the participation of external stakeholders in the eco-label standard-setting process rather than other assurance practices. Both experts and the media agree that involving more external parties in the governance of eco-labels leads to better overall governance. Castka and Corbett's work contributes to the growing and increasingly significant field of private regulation on eco-labels.

**Caven PJ, Raymond AH, Camp LJ (2025) Made in the USA: Increasing a Product's Perceived Cybersecurity by Indicating the Country of Origin.**

As stated by Caven et al. the country of origin "influences perceptions of quality and value," particularly in traditional products [39]. However, the impact of COOL on the area of embedded systems and software remains largely unexplored in the literature. This is partly due to the inherent challenges that come with determining origin in this sector. The authors believe that identifying a digital product's origin may be an important component in building consumer trust as the market continues to evolve in the digital age. They specifically reference and explore Internet of Things (IoT) devices, including a "smart camera" and "smart thermostat" in their experimental design.

Caven et al. attempt to explore how country of origin labeling impacts U.S. consumers perceptions of security, particularly for IoT devices. Regarding data collection, the authors surveyed 400 participants who were asked to choose the product which they felt was the most secure: with half given binary labels and the other half given graded labels. Additionally, half the participants were primed with public information regarding cybersecurity warnings from government agencies, while the other half were given no additional information on risk. Demographic information on income, education, gender, and race was also collected. Table 3 elaborates on the four different groups present in the experiment design and their individual purposes.

**Table 3. Experimental Results by Condition**

| Condition | Number of Respondents | Purpose |
|---|---|---|
| **Binary label, no priming** | 104 | Determine if participants would select products solely |

| | | |
|---|---|---|
| | | based on their country-of-origin |
| **Graded label, no priming** | 100 | Determine if participants would be influenced by their country-of-origin when selecting graded products |
| **Binary label, priming** | 99 | Determine if participants would be more likely to avoid a country when primed with specific risks |
| **Graded label, priming** | 97 | Determine if participants would select a lower-rated product to avoid a high-risk country when aware of the risks |

Results from the paper determine that the country of origin strongly influences trust and decision-making, particularly when consumers are primed to consider geopolitical risks. Findings show that even in situations where there is a presence of objective security indicators using a graded scale, respondents still "showed biases towards products labeled as *Made in USA*"[39]. Caven et al. articulate that their findings demonstrate the importance of allowing country of origin information to complement, rather than overshadow, the US Cyber Trust Mark. The two labeling schemes can work together to communicate objective risk and security to consumers.

**Confente I, Russo I, Peinkofer S, Frankel R (2021) The challenge of remanufactured products: the role of returns policy and channel structure to reduce consumers' perceived risk.** ***International Journal of Physical Distribution & Logistics Management*** **51(4):350–380.** https://doi.org/10.1108/IJPDLM-03-2020-0089

While remanufactured products have been extensively studied in academic literature, little is known about consumers' understanding and acceptance of these products. The authors apply the theory of perceived risk to examine how the presence of a return policy, specifically return leniency, influences purchase intentions for remanufactured products [59]. Similar to new products, a return policy helps reduce consumers' perceived risk regarding product quality, both online and brick-and-mortar retail settings. Confente et al.'s research investigates the role of return policy leniency and distribution channel choice as key factors in promoting sales of remanufactured products, drawing on recent findings that highlight the critical role of consumer return experiences in driver customer satisfaction.

The study employs a pre-test and a scenario-based main experiment to explore how return policy leniency can potentially mitigate perceived risk for consumers when purchasing remanufactured products. The experiment also examines how purchase intentions vary across different retail distribution structures. A tablet was chosen as the experimental product since

electronics is one of the leading categories for remanufactured goods. A total of 378 participants from the UK completed the survey, with a final sample size consisting of 302 participants ranging in age from 19 to 88 years, 61.3 % of whom were female. The authors utilized a 2x2x2 between-subjects design and estimated a two-factor confirmatory factor analysis model to measure perceived risk and purchase intention. Table 4 shows the attributes and each of their levels included in the 2x2x2 choice experiment.

**Table 4. Attributes and Levels of Choice Experiment**

| Attribute | Level |
|---|---|
| **Return Policy** | Lenient |
| | Restricted |
| **Product Type** | New |
| | Remanufactured |
| **Retail Channel** | Online |
| | Brick-and-mortar store |

The findings from the study show that providing consumers with a lenient return policy is an effective procedure to increase consumer purchase intention for remanufactured products. This return policy preference also holds true for new products and in all channel settings, regardless of if the channel is online or brick-and-mortar. Results determine that a lenient return policy can help reduce consumer risk perceptions of remanufactured products and therefore increases consumer purchase intention. Confente et al. find that price is closely associate with, if not reflective of risk and that consumers perceive remanufactured products as equally risky regardless of the channel they are sold on (online vs. brick and mortar).

**Darnall N, Ji H, Vázquez-Brust DA (2018) Third-Party Certification, Sponsorship, and Consumers' Ecolabel Use. *Journal of Business Ethics* 150(4):953–969. https://doi.org/10.1007/s10551-016-3138-2**

The authors examine how third-party certification influences consumer purchases, particularly in the case where there is a variation in trust [53]. They focus on how eco-labels, sponsored by different organizations, are used by consumers and how variations in certification impact purchasing behavior.

The study highlights the major differences amongst eco-labels and how these differences play a role in consumer decision-making. Eco-labels typically vary along two important dimensions: the sponsoring organization and the way in which the eco-label is monitored and verified. Sponsors of eco-labels include governments, environmental NGOs, and business associations. Regarding verification, many sponsors take an active role in monitoring conformity with eco-label standards. This process is referred to as second-party verification.

The authors also discuss planned behavior theory and its relevance to their research, explaining that this is the most commonly used theory to rationalize pro-social behavior. They

emphasize the critical role that trust plays in the decision-making process, noting that individuals are more likely to regard products and labels as credible when they trust the organizations behind them. This idea supports the hypothesis that individuals who maintain a high level of trust for governmental and environmental NGOs to provide reliable information are more likely to purchase products bearing eco-labels from these organizations.

The authors utilize a dataset collected by The Future Foundation (a consumer company) and Cardiff University's Centre for Business Relationships, Accountability, Sustainability, and Society (BRASS). The data is collected from a UK survey with a total of 1278 target UK customers completing the survey. The survey assesses consumers' perspectives on various topics related to ecolabels such as perceptions associated with their current ecolabel use, their intent to use ecolabels in future purchases, and their trust in environmental information sources. It also includes questions on personal demographics and attitudes towards environmental concerns.

Darnall and Vazquez-Brust measure consumer eco-label use in two different ways. The first measure evaluates consumers reported overall impact of eco-labels on their purchasing decisions. Respondents are asked to rate their ecolabel impact using a Likert scale. The second measure examines consumers stated intention to purchase eco-labeled products. To assess this, participants are shown images of five different UK ecolabels. After viewing each image, consumers are asked to rate, on a Likert scale, how likely their knowledge of these eco-labels would affect their in-store decisions. Additionally, the authors use several other Likert scale questions to explore topics such as trust in government, perceived personal risk towards climate change, environmental knowledge, and sense of empowerment regarding environmental concerns.

The analysis reveals a significant relationship between consumers' trust in various institutions to provide credible environmental information and their reported use of eco-labels. Consumers who express greater trust in government are 31 % more likely to consider eco-labels in their purchasing decisions. Similarly, those who expressed trust in environmental NGOs are 18 % more likely to rely on eco-labels. In contrast, distrust in private businesses to provide reliable environmental information is associated with a greater reliance on eco-labels sponsored by governments and environmental NGOs. These findings highlight the critical role of trust in shaping consumer behavior toward eco-labeled products.

**Darnall N, Ji H, Potoski M (2017) Institutional design of ecolabels: Sponsorship signals rule strength. *Regulation & Governance* 11(4):438–450. https://doi.org/10.1111/rego.12166**

Darnall and Potoski introduce the idea that not all ecolabels are created equal [30]. While some eco-labels are backed by strong guidelines designed to promote meaningful environmental improvements, others have weaker standards that permit free riding. Recognizing that it can be difficult for consumers to differentiate between strong and weak eco-labels at the point of purchase, the authors explore if the type of eco-label sponsorship a product possesses could help consumers determine the strength of the ecolabel. They focus on three categories of sponsors: industry associations, independent entities, and governments.

To investigate this, the authors analyze institutional data from 189 international eco-labels, assessing the extent to which these labels incorporate three rule categories:

environmental performance standards, monitoring criteria, and conformance requirements. They then compare these requirements across different sponsors that administer eco-labels, shedding light on the role sponsorship plays in shaping the credibility and effectiveness landscape. Within the sample data, 16.4 % were sponsored by government, 61.9 % were sponsored by independent entities, and 21.7 % were industry sponsored. To assess variations in ecolabel design by program sponsor, the authors used an omnibus Fisher's exact test (two-tailed). Table 5 shows the percentage of ecolabels that contain specific design criteria and the differences amongst these ecolabels by sponsor group.

**Table 5. Percentage of ecolabels containing specific design rules + differences between ecolabels by sponsor**

| Environmental Performance Standard | Total Average (n = 189) | Government Average (n = 31) | Independent Average (n = 117) | Industry Average (n = 41) |
|---|---|---|---|---|
| Specific metrics or performance data required | 84% | 90% | 79% | 93% |
| Conducts assessments of environmental/social impacts | 65% | 71% | 70% | 46% |
| Requires environmental/social performance improvements over time | 58% | 61% | 62% | 44% |
| **Monitoring Criteria** | | | | |
| Third party audit required | 61% | 68% | 64% | 49% |
| External third-party certification required | 63% | 55% | 68% | 54% |
| **Conformance Requirement** | | | | |
| Corrective action reports required | 75% | 65% | 80% | 68% |
| Assessment/audit reports publicly available | 34% | 36% | 38% | 24% |

Darnall et al. findings conclude that industry sponsored ecolabels have the weakest institutional design, whereas independently sponsored ecolabels have the strongest designs. As seen in Table 10, 84 % of ecolabels require that participating companies provide specific environmental metrics or performance data. Sixty-five percent routinely assess participants environmental and social impacts associated with the ecolabel, and 58 % of the ecolabels require participating companies to improve their environmental and social performance over time. The authors found that government sponsored programs have designs that are institutional and fall somewhere in the middle, although they lean more to the form of industry sponsored programs. This suggests that program sponsorship plays a critical role in conveying

the strength of an ecolabel to consumers and is likely to be effective in encouraging firms to strive for improved environmental outcomes.

**Delistavrou A, Tilikidou I (2022) Consumers' Intentions to Buy Cosmetics and Detergents with Ingredients Made from Recycled CO2. *Sustainability* 14(23):16069.**
https://doi.org/10.3390/su142316069

Delistavrou and Tilikidou explore Greek consumers' purchase intentions for innovative green cosmetics and detergents. The products discussed in the paper contain green chemicals that are produced by recycled CO2, sun, and water; however, these specific products are not currently on the market. [22]. To gather data for analysis, a survey of 306 total respondents was conducted through online interviews. A Model of the Theory of Planned Behavior was conceptualized and integrated for this study. Results from the paper indicate that perceived behavioral control was the strongest influencer of consumer intentions, followed by subjective norms, and finally attitudes. However, the impact of attitudes was found to be weak. The attribute of skepticism was seen to moderate the relationship between subjective norms and consumption intentions.

**Fu H, He W, Guo X, Hou C (2023) Influencing mechanism of consumers' willingness to pay for circular products: a meta-analytic structural equation modeling. *Environment, Development and Sustainability* 27(1):1771–1797. https://doi.org/10.1007/s10668-023-03943-1**

The authors examine the factors influencing consumer WTP for circular products [5]. By integrating the theory of planned behavior with individual perceived risk, environmental concern, social value, and product knowledge, they develop a comprehensive theoretical model to explain consumer WTP.

Past research demonstrates that consumers are willing to pay a higher price for products with a positive environmental impact. Studies applying the theory of planned behavior (TPB) have shown that consumers attitudes significantly influence their WTP for refurbished products. While this study adopts TPB as its foundational framework for exploring WTP, it acknowledges that TPB alone does not fully capture the role of motivation factors in shaping WTP. According to TPB, individual behavior is primarily determined by three components: attitude, subjective norms, and perceived behavioral control.

Fu et al. employ meta-analytic structural modeling to analyze 14 032 data points drawn from a total of 32 different studies. The authors conduct a meta-analysis to integrate findings from multiple studies to determine the overall effect size more comprehensively. However, they note that this type of meta-analysis does not allow for examining intermediate mechanisms in the causal chain. The authors adopt a five-phase method to collect and analyze the data. First, they select six databases for their literature search. Second, they apply three major selection criteria to identify relevant articles. Third, they refine the search further using specific keywords and content, ultimately identifying 32 studies that met the inclusion criteria. Fourth, they record key variables related to the theory of planned behavior—including perceived risk, environmental concerns, social values, and product knowledge. Finally, they

summarize data from these studies and conduct a meta-analysis ensuring a systematic and rigorous evaluation of the selected literature.

The results suggest that variations in national cultures, types of circular products, and respondent demographics may explain the differences observed between samples. The meta-analysis found that perceived behavioral control had the strongest positive impact on consumers' WTP for circular products, followed by consumer attitude and subjective norms. Higher perceived risk was seen to reduce positive attitudes towards circular products; however, this negative effect can be mitigated by increasing consumers' product knowledge. The meta-analysis also showed that both environmental concern and social value had a significant positive impact on consumer attitudes. As environmental concern increased, so did the importance of social value, such as receiving social recognition for using circular products. Additionally, product knowledge was found to have a dual effect: it significantly enhanced consumer attitudes while simultaneously reducing perceived risk associated with circular products. Table 6 outlines the results of each correlation variable regarding their total effect on consumer WTP and consumer attitudes.

**Table 6. Correlation variable and its effect on WTP and consumer attitudes**

| Correlation variable | Total effect on WTP | Total effect on consumer attitude |
|---|---|---|
| Consumer attitude | 0.171 | - |
| Subjective norm | 0.119 | - |
| Perceived behavioral control | 0.323 | - |
| Perceived risk | -0.335 | -0.215 |
| Environmental concern | 0.337 | 0.307 |
| Social value | 0.110 | 0.206 |
| Product knowledge | 0.316 | 0.392 |

**Fu H, He W, Feng K, Guo X, Hou C (2024) Understanding consumers' willingness to pay for circular products: A multiple model-comparison approach. *Sustainable Production and Consumption* 45:67–78. https://doi.org/10.1016/j.spc.2023.12.005**

Fu et al. employ a mixed methods design to systematically review and compare theoretical models used to analyze consumers WTP for circular products [6]. The authors evaluate six key theoretical approaches of modeling consumer WTP for circular products:

- Theory of Reasoned Action
- Theory of Planned Behavior
- Theory of Perceived Risk
- Theory of Perceived Value
- Norm Activation Theory

- Theory of Consumption Values

All six of these models demonstrate an ability to explain the variation in WTP, with the Theory of Consumption Values having the strongest explanatory power, based on $R^2$. The authors aimed to evaluate the effectiveness of these models in predicting consumers WTP for circular products. They identified valid variables through the analysis and used the explanatory power, represented by $R^2$, to assess the optimal model.

The paper examines the correlations between factors in common theoretical models, introducing regions and types of circular products as moderators. The authors employ a mixed-methods approach, integrating both qualitative and quantitative methods for a comprehensive data analysis. The study employs a seven-phase data collection procedure to ensure a structured and detailed approach to the research. For the qualitative section, an exploratory design is employed, involving a focused and systemic review process. Article selection was based on three key criteria: relevant research methodology, theoretical models, and variables. These factors were then thoroughly explored and reviewed to inform the analysis.

In the quantitative section, an embedded design was applied, incorporating insights from the qualitative section into the data collection and results. The primary method used for analysis in the quantitative section is meta-analytic structural equation modeling, allowing for a robust examination of relationships between variables.

The findings reveal a strong positive correlation between personal norms and WTP for circular products. Among the related variables, “attitude” emerges as the most commonly identified factor in existing research, encompassing two dimensions: emotion and cognition. Emotion, which is the relevant variable in the Theory of Consumption Values, plays a crucial role in shaping consumer’s WTP. Attitudes have consistently been a notable predictor of WTP across various contexts and behaviors. Other key variable that are involved in the relevant theoretical models used by the authors are perceived risk, price, and quality.

The report indicates that the correlation between subjective norms, perceived behavioral control, and quality value with WTP is more significant in developing countries compared to developed ones. Similarly, the correlation between emotional value and price value is also more significant in developing countries than developed, suggesting that regional and economic contexts significantly influence consumer behavior toward circular products.

**Gatti N, Gomez MI, Bennett RE, Scott Sillett T, Bowe J (2022) Eco-labels matter: Coffee consumers value agrochemical-free attributes over biodiversity conservation. *Food Quality and Preference* 98:104509.** https://doi.org/10.1016/j.foodqual.2021.104509

Gatti et al. evaluate the consumer preference for coffee, comparing regular coffee with that labeled as organic, pesticide free, shade grown, and a brand name [31]. They investigate consumer demand for sustainable attributes in coffee, seeking to find which qualities of sustainably produced coffee are most preferred by customers.

The authors use a Random Utility Model (RUM) approach to estimate consumers WTP where consumers obtain utility from selecting hypothetical sustainable coffee options. The model allows the authors to determine preferences over attributes and rank each from most to least preferable. Gatti et al. collect responses from 774 U.S. coffee drinkers ranging from 18 to over 75. They designed and implemented an online choice experiment where consumers

choose between two coffees with two attributes: price and an assigned sustainability attribute. Their goal was to estimate consumer utility function while also gathering information on consumer purchasing decisions and familiarity with coffee attributes and eco-labels.

The authors use a brand name certification standard which contains four major sustainable attributes. They separate these attributes into tiers as shown in Table 7. The table demonstrates sustainability levels from most sustainable (shade-grown) to least sustainable (none) along with the average premium that consumers are willing to pay based on survey results.

**Table 7. Factor Analysis and Experimental Conditions**

| Attribute | Levels | Definition | Mean WTP |
|---|---|---|---|
| **Sustainable attribute** | Shade-grown | Coffee is planted under a canopy of trees instead of on farmland that agriculture procedures has cleared of all other vegetation | $1.44 premium |
| **Sustainable attribute** | Brand Name | Coffee is farmed in an environment that protects habitats for birds and other wildlife | $2.23 premium |
| **Sustainable attribute** | Organic | Coffee is farmed without the presence of any chemicals. This includes synthetic fertilizers, pesticides, and herbicides | $5.76 premium |
| **Sustainable attribute** | Pesticide-free | Coffee is grown without pesticides; however other chemicals may be present such as fertilizers | $3.59 premium |
| **Sustainable attribute** | None (standard) | Coffee contains no sustainable qualities | None |

The findings show that consumers prioritize agrochemical management over other aspects of biodiversity. Based on this, the authors suggest that eco-labels can enhance consumer interest by emphasizing and enforcing robust agrochemical standards, such as pesticide-free production alongside features that promote biodiversity. The authors also note that consumer preferences seem to favor consumer health (e.g., pesticide-free products) over biodiversity/sustainability. They suggest that coffee products could maximize price premiums by combining health-focused attributes with sustainability efforts.

**Giam X, Mani L, Koh LP, Tan HTW (2016) Saving Tropical Forests by Knowing What We Consume: Consumer attitudes on sustainable palm oil. *Conservation Letters* 9(4):267–274. https://doi.org/10.1111/conl.12209**

Giam et al. conduct the first study to investigate consumer attitudes and WTP for deforestation-free sustainable palm oil free products [45]. They employ a hybrid data collection method combining face-to-face interview and self-administered questionnaires. Data was collected from 251 respondents exiting 10 supermarkets in Singapore between February and March 2012.

The study focused on common products that are known to often contain palm oil, such as chocolate bars, cookies, margarine, moisturizers, potato chips, and soap. Respondents were first asked whether they had purchased any of these products in the past year; if they had, they were classified as consumers. Next, the interviewers asked consumers if they thought specific brands of these products contained palm oil. Respondents could answer "yes," "no," or "not sure." For those who were uncertain, a follow-up question was posed, asking whether they would be more or less likely to buy the product if they knew it contained palm oil.

The authors also tested whether consumers were less likely to purchase a product after learning it was linked to deforestation (as opposed to merely containing palm oil). They did this by conducting a one-sided Monte Carlo test. This approach allows the authors to assess how awareness of deforestation influences consumer purchasing decisions. Table 8 shows consumers WTP for sustainable (deforestation free) palm oil products. As shown in the table, consumers displayed strong negative opinions towards products that lead to deforestation.

**Table 8. WTP for sustainable palm oil products**

| Product | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **Chocolate** | 33 % | 70 % | 86 % | 74 % | 9.9 % |
| **Cookies** | 26 % | 70 % | 83 % | 70 % | 9.2 % |
| **Margarine** | 20 % | 57 % | 87 % | 69 % | 8.2 % |
| **Moisturizers** | 30 % | 52 % | 86 % | 72 % | 9.3 % |
| **Potato Chips** | 24 % | 62 % | 84 % | 72 % | 9.3 % |
| **Soap** | 20 % | 52 % | 88 % | 73 % | 9.5 % |

2* Percentage of consumers who were unsure if their products contained palm oil but said they would be "less likely" or "much less likely" to purchase the product if they knew it contained palm oil
3* Percentage of consumers who were unsure if their products contained palm oil but said they would be "less likely" or "much less likely" to purchase the product if they knew it causes deforestation
4* Percentage of all consumers who answered they were "more likely" or "much more likely" to purchase the sustainable (deforestation-free) alternative of a given product
5* Percentage of all consumers who answered they would be willing to pay a price premium to purchase the sustainable alternative of a given product
6* Mean price premium for the sustainable alternative (deforestation free) of a given product

The study reveals minimal consumer bias against palm oil itself but highlights strong negative perceptions of products linked to deforestation. Consumers indicated a willingness to pay a price premium of 8.2 % to 9.9 % for deforestation-free alternatives. The majority of

consumer, regardless of their awareness of palm oil, expressed a higher likelihood of purchasing sustainable, deforestation-free products over unsustainable options if such alternatives were available.

**Gracia A, Barreiro-Hurlé J, Pérez Y Pérez L (2020) Assessing the benefits of sustainability certification of biofuels: how much are consumers willing to pay? *New Medit* 19(2). https://doi.org/10.30682/nm2002a**

Gracia et al. explore biofuels as a potential option to encourage GHG emission reductions [51]. They specifically examine consumer social preferences and the willingness to pay for certified (sustainable) biofuels in Spain. The study employs a discrete choice experiment using data from a survey conducted in 2010 from face-to-face surveys in Zaragoza, a medium sized town in Spain. By applying a choice experiment, the authors can measure WTP for biodiesel across multiple attributes simultaneously, aligning with random utility theory. The target population consisted of adults who use motor vehicles. The questionnaire was designed to capture consumer attitudes, knowledge, and preferences regarding biodiesel, focusing on climate change concerns, fuel purchasing habits, and actual or intended biodiesel consumption.

Few empirical studies have analyzed the WTP for biofuels, as ethanol and biodiesel have only reached relevant production and consumption figures in recent years. The study revealed that consumers are highly concerned about climate change, specifically believing that fossil fuel consumption exacerbates the issue, and that energy conservation should take precedence over any other energy alternatives. However, participants were indifferent about the idea that biofuels should be prioritized over other renewable energy sources. Despite this, findings indicate that consumers are willing to pay a premium for biodiesel. Specifically, consumers expressed a WTP an additional €0.05 per liter of biodiesel and €0.06 per liter of biodiesel with sustainable certification. This equates to a 5 % premium for biodiesel which is slightly lower than the premium they were willing to pay for the convenience of finding biodiesel at their regular petrol station (6 %).

The authors find that consumers are willing to pay a price premium for certified biofuels, with higher premiums for fuel availability at the consumers typical filling station. The results also separate customers into two distinctive groups. The first group, “biodiesel seekers,” prioritize the environmental benefits of biodiesel and are willing to pay a premium for certified sustainable biofuels. The second group, “convenience seekers,” place greater importance on fueling convenience and biodiesel availability at familiar stations. These consumers are less included to seek out biofuel at alternative locations unless incentivized with a discount. Overall, the study underscores the importance of both environmental certification and accessibility in fostering consumer adoption of biodiesel.

**Grappe CG, Lombart C, Louis D, Durif F (2021) “Not tested on animals”: how consumers react to cruelty-free cosmetics proposed by manufacturers and retailers? *International Journal of Retail & Distribution Management* 49(11):1532–1553. https://doi.org/10.1108/IJRDM-12-2020-0489**

Grappe et al. investigate the effect of the “not tested on animals” claim on consumers’ attitude and behavioral intentions in reference to cosmetic products through an enriched version of the Theory of Planned Behavior. As stated by Grappe et al. “the Theory of Planned Behavior explains the adoption or non-adoption intention of a behavior through the attitude held towards this behavior, perceived behavioral control and subjective norms” [41]. Four hundred and fifty participants from Quebec, Canada were recruited from a social network of a cosmetics and personal hygiene brand to complete a questionnaire. Amongst the 450 respondents, individuals were randomly separated into either a treatment group (n=226) or a control group (n=224); with the treatment group considering a shampoo bottle with a “not tested on animals” claim present, and the control group considering the same shampoo bottle with the claim absent. Results determine that both external variables (credibility and attitude towards marketing claims) and internal psychological variables (subjective norms and altruistic concerns with animal welfare) influence consumer attitudes towards personal care products that possess “not tested on animals” claims. These variables also influence consumer purchase intentions for these products.

**Grankvist G, Johnsen, S. Å. K., Hanss, D Values and willingness-to-pay for sustainability-certified mobile phones.** ***International Journal of Sustainable Development & World Ecology*** **26(7):657–664.**

Grankvist et al. investigate the WTP for mobile phones labeled with environmental or social (fairtrade) sustainability certification among students in the EU [32]. They extend their research by examining whether endorsement of personal values is associated with a higher WTP for these products. The authors believe that their research provides the first piece of work to explore associations between the importance attached to personal values and WTP a premium for mobile phones with environmental and social sustainability labels. Some of the values that considered include:

- Universalism
- Benevolence
- Power
- Achievement

The study involved 767 participants, consisting of students from Norway (196), Sweden (247) and Germany (276). Participation was both voluntary and anonymous, using a self-report inventory to measure the WTP and the importance each participant attaches to values. Participants in the Swedish and Norwegian samples were willing to pay an average 18 % more for a mobile phone with environmental or social sustainability labels, while German participants showed willingness to pay 12 % more. Outside of discrepancies between countries, the authors also found some differences between gender, with women exhibiting a higher WTP, and between social versus environmental labels, with social labels garnering higher WTP. In relation to personal values, they discover that people who were motivated by “power” exhibited the lowest over WTP.

**Hamzaoui Essoussi L, Linton JD (2010) New or recycled products: how much are consumers willing to pay? *Journal of Consumer Marketing* 27(5):458–468. https://doi.org/10.1108/07363761011063358**

The authors evaluate the price premium that consumers state they are willing to pay for products with reused or recycled content [58]. They also attempt to investigate the impact of product category on consumers' willingness to pay premium prices. They assess consumers WTP for seven different product categories by conducting a survey of 49 graduate students. These categories include: paper, single use camera, toner cartridge, tire, auto part, cell phone, and printer/fax machine. They utilize the method outlined by Ranasinghe and Russell (1993) in their research on economic risk analysis. This approach, later adapted by Hamzaoui-Essouossi and Linton, was applied to analyze seven distinct product categories in the report. Hamzaoui-Essouossi and Linton form four major hypotheses to test consumer WTP. The four hypotheses are as follows:

(1) Recycled products versus new/conventional products do not have the same value
Result: For all seven products, all 49 respondents showed a statistically significant difference for WTP
(2) Consumers' WTP premium price for recycled products is product specific
Result: Found that 11 out of a possible 21 pairs of the seven different products under consideration had a statistically significant difference
(3) The level of functional risk associated to the product category influences consumers' WTP a premium price between new/conventional product and product containing reused or recycled material
Result: The lower the level of functional risk associated with the product, the greater the WTP for the product
(4) Switching behavior in WTP is stronger for high functional risk versus low functional risk
Result: Consumers switch from purchasing to not purchasing recycled products over a small price range, if the product has a higher functional risk

The findings reveal that perceived functional risk of a product is an important driver of consumer WTP. Products with higher perceived risks require greater price discounts compared to their new product counterparts, although this varies across product categories (e.g., paper versus auto parts). Additionally, factors such as brand reputation and warranties can help reduce a product's perceived risk. At the product level, the study highlights the practical importance of addressing perceived functional risk. Consumer WTP is directly tied to the level of perceived functional risk associated with a product category. Therefore, they suggest it is necessary that companies carefully evaluate and mitigate the functional risks associated with recycled products, as these perceptions significantly impact sales and the acceptable price point for the product.

**Harkness C, Areal F (2018) Consumer willingness to pay for low acrylamide content. *British Food Journal* 120(8):1888–1900. https://doi.org/10.1108/BFJ-01-2018-0043**

Harkness and Areal examine consumer WTP for low acrylamide content in baby food [24]. The paper employs a discrete choice experiment on UK consumers, incorporating a variety of levels for seven different attributes. These attributes include packaging, production method, acrylamide level, sugar, salt, one of five portions of fruit and vegetable per day and price. A mixed logit model is used to estimate consumer WTP. Results from the paper indicate that consumers place a higher value on safer baby food with low acrylamide content. The attribute of low acrylamide content has the largest impact on WTP out of all attributes observed; with consumers willing to pay a 105 % premium. A consumer preference for organic baby food over generic label was also identified.

**Harms R, Linton JD (2016) Willingness to Pay for Eco-Certified Refurbished Products: The Effects of Environmental Attitudes and Knowledge. *Journal of Industrial Ecology* 20(4):893–904. https://doi.org/10.1111/jiec.12301**

Harms and Linton expand on the literature regarding refurbishing products, a category of products that are a key strategy to help reduce waste [13]. However, previous research finds that consumers' WTP for refurbished products remains low. The authors explore strategies that can be put into place to help increase WTP and grow consumer markets for refurbished products. They do this by investigating the impact of independent eco-certificates.

The report examines the relationship between eco-certification and WTP for refurbished products. Refurbishing is defined by the authors as the "process of disassembling, cleaning, inspecting, repairing, replacing, and reassembling the components of a part or product to like-new condition" [13]. The authors choose to focus on eco-certification due to prior research showing that, while refurbishing tends to negatively impact WTP, eco-certification has a positive effect. This study represents a novel attempt to explore the combined impact of these two characteristics on WTP at a product-specific level.

The central research question investigates the extent to which environmental knowledge and attitudes influence variations in individuals' WTP for eco-certified refurbished products. The analysis is based on survey responses from 231 potential customers, who are all students at the University of Twente in the Netherlands. The sample consisted of 36 % female and 64 % male respondents, with a mean age of 20. To ensure the reliability of results, the authors mitigated social desirability bias in responses. They employ a combination of Wilcoxon signed-rank tests and ordered logistic regression analysis to address their hypotheses, providing a robust methodological approach to their investigation. Table 9 outlines consumer's WTP in respect to a variety of products with a variety of different sustainability characteristics.

**Table 9. WTP in respect to varying products**

| Model Type | Aspect | Single use camera | Cell phone | Printer | Toner cartridge | Car tire |
|---|---|---|---|---|---|---|
| **Standard Price** | - | € 10 | € 100 | € 100 | € 50 | € 100 |
| **Branded Product** | WTP | € 9.93 | € 100.08 | € 100.94 | € 49.93 | € 101.54 |
| | Change in WTP (%) | -0.66 | 0.08 | 0.94 | -0.14 | 1.54 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Branded product with reused components** | WTP | € 9.59 | € 93.84 | € 95.69 | € 46.50 | € 94.30 |
| | Change in WTP (%) | -4.11 | -6.16 | -4.31 | -7.00 | -5.70 |
| | Change in WTPbranded (%) | -3.47 | -6.24 | -5.20 | -6.48 | -7.13 |
| **Branded product with reused components and eco-certification** | WTP | € 9.94 | € 97.62 | € 98.51 | € 49.01 | € 97.48 |
| | Change in WTP (%) | -0.65 | -2.38 | -1.49 | -1.98 | -2.52 |
| | Change in WTPbranded (%) | 0.01 | -2.76 | -2.64 | -2.04 | -4.47 |

The findings reveal that individuals with higher pro-environmental attitudes are more willing to pay for refurnished products and eco-certified items. While WTP for refurbished products is generally lower compared to virgin-source products, eco-certification has the potential to increase the perceived value and WTP for refurbished goods. Interestingly, while green attributes were strongly associated with higher WTP, attitudes specifically toward recycling did not show the same effect. The authors suggest that this unexpected result may stem from consumers perceiving recycling and product reuse as distinct concepts, with differing levels of acceptance or perceived environmental benefit.

**Hein N (2022) Factors Influencing the Purchase Intention for Recycled Products: Integrating Perceived Risk into Value-Belief-Norm Theory. *Sustainability* 14(7):3877. https://doi.org/10.3390/su14073877**

The paper examined the specific factors that influence consumers decision making process when choosing to purchase recycled products. The author explores recycled product purchase intention through the lens of Value-Belief-Norm (VBN) theory [7]. VBN posits that values shape beliefs, beliefs influence personal norms, and personal norms ultimately drive behavior. VBN has previously been used to empirically analyze the purchase behavior of green products, making it a relevant framework of analysis for this paper. The authors incorporate perceived risk to the model as a moderating factor, recognizing its ability to hinder purchase intention. The relationships between these variables are analyzed using partial least squares structural equation modeling to provide a comprehensive understanding of factors influencing consumer behavior in this context.

The authors utilize a sample of 177 respondents from Germany with a distribution of 48 % male and 52 % female and a majority age between 30 and 49. To measure consumers' intention to purchase recycled products, the authors develop measurement scalers and items based on existing literature. Key variables assessed included environmental concern, awareness of consequences, ascription of responsibility, personal norms, perceived risk, and purchase intention, all measured on a 5-point Likert scale. Additionally, altruistic and biospheric values were also measured on a 5-point Liker scale and included in the analysis. The data was analyzed using partial least squares structural equation modeling to explore the relationships between these variables and consumer purchase intentions.

Results indicate that the causal chain of relationships between values, beliefs, and personal norms has a positive influence on the purchase intention for recycled products. The authors find that perceived risk has a direct negative effect on purchase intention. Both biospheric and altruistic values are shown to have a significantly positive effect on environmental concern. Environmental concern has a strong positive influence on awareness of consequences, highlighting its role in shaping consumers' environmental beliefs. Personal norms are shown to have a significantly positive effect on purchase intention, emphasizing the importance of moral obligations in driving behavior. Interestingly, the authors find that when perceived risk is high, personal norms have a stronger effect on purchase intention. This suggests that the moral obligation to contribute to the protection of the environment can outweigh consumers' self-interest, encouraging them to purchase recycled products despite perceived risks. The paper has certain limitations as it focuses on recycled products as a whole and does not consider the purchase intention of specific recycled product types or groups.

**Janssen M, Hamm U (2012) Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos. *Food Quality and Preference* 25(1):9–22. https://doi.org/10.1016/j.foodqual.2011.12.004**

Janssen and Hamm investigate consumer preferences and willingness to pay for organic products, specifically apples and eggs, with a focus on how different certification logos influence purchasing decisions [28]. The study also includes a "no-buy" option in its discrete choice experiment to assess consumer behavior comprehensively.

The experiment tested four types of organic certification logos:

- The EU organic logo
- Governmental certification logos
- Private certification logos
- A generic label with the prefix "organic" but no logo

Four different price levels were tested, with relative price differences kept consistent across six surveyed countries. Absolute prices used in the experiment were based on the average market prices for organic apples and eggs in each region one month before the experiments were conducted. The survey included approximately 400 consumers per country, capturing diverse perspectives across the selected nations.

The findings show that very few consumers trust generic labeling without a certification logo, leading to lower WTP. In contrast products with certification logos were associated with higher WTP, particularly for logos perceived as trustworthy, well-known, and backed by strict organic standards and control systems. The highest price premiums were observed for products carrying such logos, emphasizing the importance of trust and credibility in driving consumer decisions.

Not all of the increased WTP can be attributed to logo recognition. The structure and scheme of the certification also appears to play a role. Additionally, consumers who regularly

purchase organic products showed a higher WTP across all certification types, suggesting that frequent buyers place greater value on the authenticity and assurance provided by certified organic goods. Janssen and Hamm emphasize the importance of certification labels when it comes to enhancing consumer trust and boosting WTP for organic products. They do this while also highlighting the potential for certifications to further shape perceptions of credibility and quality.

**Joung SH, Park SW, Ko YJ (2014) Willingness to pay for eco-friendly products. *Asia Marketing Journal* 15(4). https://doi.org/10.53728/2765-6500.1565**

Joung et al. investigate consumers' willingness to pay (WTP) a premium for eco-friendly cosmetics while determining the factors that specifically influence this willingness to pay [21]. The authors measure WTP across four different groups of eco-friendly cosmetics: low-priced skin care, low-priced makeup, high-price skin care, and high-price makeup. Face to face interviews in combination with online surveys performed are used for data collection, yielding a sample size of 226 respondents all residing in the Seoul and Kyeonggi area of Korea in May 2010. Joung et al. use both the dichotomous choice and payment card approaches of the contingent valuation method to elicit willingness to pay. Results from the paper show that consumers are WTP a premium for all four groups of eco-friendly cosmetics, however the size of the premium varies based on the product group. Consumer willingness to pay was highest for low-priced skin care, followed by low-priced makeup, high-priced skin care, and finally high-priced makeup. These results validate that consumers determine the degree of premium in which they are willing to pay based on the price of the good and the attributes of eco-friendly products.

**Klaiman K, Ortega DL, Garnache C (2016) Consumer preferences and demand for packaging material and recyclability. *Resources, Conservation and Recycling* 115:1–8. https://doi.org/10.1016/j.resconrec.2016.08.021**

The authors employ discrete choice experiments to assess consumer willingness to pay (WTP) for beverage product packaging materials and recyclability, specifically focusing on fruit drink containers [15]. To address social desirability bias and analyze the effects of information on consumer behavior, the study incorporates indirect questioning and a video treatment. These methods allow the authors to explore consumer preferences for packaging material and product recyclability while accounting for potential biases in self-reported data.

Discrete choice experiments are particularly useful for evaluating consumer demand for intangible product attributes, such as recyclability, which are not directly observable in traditional markets. By analyzing consumer choices, the authors can determine which product characteristic have the greatest influence on consumer utility and overall product demand.

The total sample is composed of 1500 observations, divided evenly across three treatment groups (see below), with 500 responses per group. The DCE focuses on purchasing fruit juice drink products and uses three key attributes to describe the product: packaging material, product recyclability, and price. These attributes were selected based on their relevance to both consumers and sustainability goals, ensuring that the scenarios presented in

the experiment were realistic and meaningful for participants. Table 10 demonstrates each attribute involved in the DCE and their respective levels. In addition to the choice experiment, demographic and socioeconomic data was also collected on the respondents and their household.

**Table 10. Correlation variable and attribute levels**

| Attribute | Levels |
|---|---|
| Packaging material | Glass |
| | Aluminum |
| | Plastic |
| | Carton |
| Product recyclability | Recyclable |
| | Non-Recyclable |
| Product price ($/12-oz container) | $0.75 |
| | $1.00 |
| | $2.00 |
| | $3.00 |

To test the presence of social desirability bias and the effects of information on consumers, the authors separated the respondents into three treatment groups:

(1) Respondents evaluated the standard choice experiment without exposure to information
(2) Respondents received a set of indirect questions regarding the CE, where they were asked to assess the choice scenarios as "the average American"
(3) Respondents evaluated the choice experiment after viewing a video on recycling

The findings show that among packaging materials, consumer WTP was highest for plastic packaging, followed by glass, carton, and aluminum. Indirect questioning was seen to lead to WTP values for packaging recyclability that were 60 % lower than those obtained through direct questioning, highlighting the potential influence of social desirability bias. The inclusion of a video treatment was seen to have a significant positive effect on consumer preferences and demand for recyclability, increasing WTP by 31 cents (24 %) compared to the average price in the control group. Across all treatment groups, respondents showed positive utility for both recyclability and packaging materials, with a consistently higher WTP for recyclable plastic packaging compared to glass and carton. Based on their findings, the authors suggest that more scrutiny should be placed on studies that do not address social desirability bias when evaluating recycling behavior.

**Koschate-Fischer N, Diamantopoulos A, Oldenkotte K (2012) Are Consumers Really Willing to Pay More for a Favorable Country Image? A Study of Country-of-Origin Effects on Willingness to Pay. *Journal of International Marketing* 20(1):19–41.** https://doi.org/10.1509/jim.10.0140

Koschate-Fischer et al. utilize equity theory and cue utilization theory to investigate whether a brand's country-of-origin affects consumer WTP. They extend this research to determine the extent to which consumer brand familiarity moderates this relationship. As stated in the paper, equity theory measures the outcome that people receive from an exchange in comparison to the input they provide into the exchange [62]. As for cue utilization theory, consumers use information collected from a variety of cues to make product-related deductions in an attempt to evaluate a given product's quality.

Carried out in the second half of 2008, the authors conduct three complimentary, yet self-standing, experimental studies, using different countries and actual brands as their stimuli. These experiments function to investigate the effects of country of origin labeling for highly familiar and less familiar brands, as well as conjure a WTP elicitation. Using equity theory as the theoretical foundation, findings from the paper reveal that consumers are willing to pay higher prices for products that are branded with a country-of-origin label sourcing from a country with a favorable country image in comparison to products with a COO label from a country with a less favorable image. Koschate-Fischer et al. state that "consumers not only prefer and assign a higher value to branded products from a COO with a favorable country image but also, consistent with equity theory, are willing to spend more money to obtain them" [62]. Results show that WTP for highly familiar brands is not materially affected by the COO label. However, brand commitment exhibited a positive influence on consumers WTP which is consistent with previous research. The study also emphasizes the importance of COO labels as a consumer behavior cue. The authors advocate that the COO cue influences not only consumers perceptions but also their actions. Findings also confirm that there is a "negative moderating influence of brand familiarity on the COO effect in a high-involvement setting but not in a low-involvement setting".

**Krissoff B, Kuchler F, Nelson K, Perry J, Somwaru A Country-of-Origin Labeling: Theory and Observation.**

The paper assesses the economic rationale behind both the positive and negative claims surrounding the effects of mandatory country-of-origin labeling (COOL). Krissof et al. specifically look at the United States market. Mandatory COOL measures would require retailers to legibly identify the country of origin on red meats, fish and shellfish, fresh and frozen fruits and vegetables, and peanuts. As production and distribution moves along the supply chain, the COO identification process can get complicated as origin information must be maintained and transferred to ensure accurate labeling.

The authors also explore voluntary U.S. country-of-origin labels and note that these labels are not often observed on food products and in retail advertising. Even in scenarios where these labels are present, they tend not to be as prominent as other attributes. This information suggests that food suppliers may view any additional profits of including U.S. COO labels as less than the additional costs. This speculation is confirmed by Krissof et al. as they find minimal evidence that the market is not efficiently meeting the preferences of consumers for country-of-origin information and labels. The authors consider the labeling, record-keeping, and operating costs that would come with the incorporation of mandatory COOLs and include these costs in a general equilibrium model. Results from the model determine that production,

exports, and imports of COOL mandated commodities "would likely decline somewhat, with a small loss in economywide purchasing power resulting" [40].

Krissof et al. determine that mandating that all U.S. covered commodities by labeled with COO content is not likely to change the quality of U.S.-origin products. Krissoff et al. incorporate the additional labeling, recordkeeping and operating costs that suppliers would absorb and incorporated them into a computable general equilibrium model with the goal of measuring the impact of mandatory COOL on the food sector and the economy. Results from the equilibrium model indicate that "production, exports, and imports of covered commodities would likely decline somewhat, with a small loss in economywide purchasing power resulting" [40]. They believe that there is minimal evidence to show that label-conscious consumers represent more than just a niche portion of the market.

**Krystallis A, Chryssohoidis G (2005) Consumers' willingness to pay for organic food: Factors that affect it and variation per organic product type. *British Food Journal* 107(5):320–343.** https://doi.org/10.1108/00070700510596901

Krystallis and Chryssohoidis examine Greek consumers' willingness to pay (WTP) for organic food products shedding light on the factors influencing this behavior [8]. Their research arises from previous findings showing that Greek consumers are less confident about their food supply and pesticide residues compared to British consumers and those in other developed nations. The authors explore why this discrepancy exists and identify which characteristics affect consumers' WTP for organic products. The data and the literature review conducted by Krystallis and Chryssohoidis show that organic food purchases are mainly attributed to consumers' environmental concerns and food quality/safety concerns [8]. This means the WTP for organic products is a good predictor of organic food demand.

The authors used a structured questionnaire administered to a sample of consumers who were knowledgeable about the term "organic food." Respondents were asked about their purchasing habits, criteria that influenced their purchasing choices (e.g., origin, appearance, brand, nutritional value), and their trust in merchants and certification bodies involved in food supply chain quality control. They also asked respondents to rank a list of 16 food products based on everyday household use, whether any of those products were bought as organic, and state how much more they would be willing to pay for the organic versions.
Participants were recruited at three retail chain outlets in different areas of Athens, with 250 individuals approached and 164 included in the survey. Sampling criteria required participants to have real knowledge of the term "organic food". Within the paper, the authors build a survey that attempts to answer four main questions regarding Greek consumers' WTP for organic food products:

- How do consumer's WTP differ according to the organic product category?
- Does the WTP for the organic version of a product increase in the most frequently purchased categories of conventional food products?
- Do the factors influencing WTP for organic products in Greece align with those identified in international literature? These factors include product-specific attributes (food

quality and safety) as well as consumer-specific traits (trust and socio-demographic characteristics).

- Does the magnitude of factors that affect WTP for organics in Greece change according to the organic product category that is under examination?

The study reveals key insights into consumer behavior, demographics, and priorities. The findings align with the typical organic food buyer profile: younger, educated women under 34 years old, often married, who are aware of organic food concepts. Over 50 % of respondents attributed high importance to factors like price, taste, certification or production method, nutritional value, environmental benefits, raw materials, and country of origin. Among these, more than 80 % of respondents emphasized price, taste, certification, and environmental benefits as crucial. Less than one-third of consumers expressed trust in merchants, labels, and certification bodies, however trust in quality labels or logos and food certification bodies was relatively high. Table 11 outlines the criteria that consumers consider most important when purchasing food. Column 1 lists the criteria influencing purchasing decisions, while column 2 shows the percentage of individuals who agree or strongly agree with each criterion (table only shows criterion with a percentage over 80 %).

The study found high purchasing frequencies for 16 food product categories, with foods such as fruit, vegetables, milk, pasta, bread, feta cheese, poultry, and legumes leading the list. Organic purchasing frequency was also found to be highest in this group of foods. Consumers exhibited variation in their WTP a premium for organic products, with preferences shaped by the type of product and its purchasing frequency. For many products, consumers showed a U-shaped WTP preference.

Organic fruits and vegetables stood out as exceptions, as consumers demonstrated the lowest percentage of WTP more for these products and substantial WTP percentages across all the price increments examined. That suggest that these items, which are more widely available and familiar in Greece, reflect actual consumer behavior rather than just stated preference. Krystallis and Chryssohoidis findings suggest that both quality and trust significantly drive consumers WTP premiums for organic products. The study highlights that consumer concerns about food quality, safety, and environmental impact are pivotal in shaping demand for organic products. The results offer valuable insights for policymakers, retailers, and certification bodies aiming to expand the organic product market in Greece by addressing trust issues from consumers.

**Table 11. Criteria's Influence on Consumer Decisions**

| Criteria | Strong Agree or Agree (%) |
|---|---|
| **The Price** | 90.2 % |
| **The taste of the product** | 86.0 % |
| **The certification of its production methods** | 86.0 % |
| **The nutritional value of the product** | 84.8 % |
| **Environmental benefits** | 81.7 % |

| | |
|---|---|
| **The raw materials used to produce it** | 81.7 % |
| **The product's country of origin** | 81.1 % |

**Lim KH, Hu W, Maynard LJ, Goddard E (2014) A Taste for Safer Beef? How Much Does Consumers' Perceived Risk Influence Willingness to Pay for Country-of-Origin Labeled Beef. *Agribusiness* 30(1):17–30. https://doi.org/10.1002/agr.21365**

Previous literature demonstrates that country of origin labeling affects consumers demand for food products. However, apart from ethnocentrism or the desire to support domestic industries, much of the underlying motivation for this demand has not been explored in the literature. Lim et al. assess consumers' preferences for imported and domestic beef through a choice experiment. Results from this study suggest that the advantage of domestic beef over imported beef can be partly explained by consumers' risk handling behavior.

The authors conducted an online U.S. nation-wide consumer survey in May 2010. The survey closed when the targeted number of 1000 respondents was reached. The survey is divided into two sections: the first section included questions about consumers' behavior and perceptions related to food consumption and the second section included a choice experiment to assess consumer WTP for imported beef and the other attributes. Four price levels were chosen to reflect both low-end and high-end prices that can be observed in the grocery store. Alongside domestic beef, the authors also included Australian and Canadian beef as these two nations are the largest volume exporters of beef to the United States. A total of 192 choice sets were produced by the experimental design, each containing two beef profile and a would-not-buy option. Socioeconomic demographics were also recorded for all survey respondents with respondents skewing slightly on the older side and 83 % classifying themselves as the primary shopper for their household.

**Table 12. Attributes and Levels of Choice Experiment**

| Attribute | Level |
|---|---|
| **Price ($/lb)** | 5.50 |
| | 9.00 |
| | 12.50 |
| | 16.00 |
| **Country of Origin** | USA |
| | Canada |
| | Australia |
| **Production Practices** | Approved Standards |
| | Natural |
| **Tenderness** | Not Specified |
| | Assured Tenderness |
| **Food-safety assurance** | None |
| | BSE-Tested |

| | |
|---|---|
| | Traceable |
| | Traceable and BSE-Tested |

Consumer risk preferences and attitudes were captured through a variety of Likert style statement questions, asking individuals to rank statements from 1 to 5 based on if they believe the statement contains “very little risk” (1) or “a great deal of risk” (5). The last series of questions were used to capture risk perceptions for beef by COO. The authors find “tangible and systemic influence of perceived risk to consumers’ preferences for COO labeled beef”[63]. Overall, consumer WTP for imported beef is associated with how individuals perceive the general safety of the country that the beef is being imported from. Extrapolating on these results, the authors conclude that American beef products’ advantage over their imported counterparts stems from the consumer belief that American beef is safer, or that consumers “are not familiar with the food-safety level of the imported products” [63].

**Liu C-C, Chen C-W, Chen H-S (2019) Measuring Consumer Preferences and Willingness to Pay for Coffee Certification Labels in Taiwan. *Sustainability* 11(5):1297. https://doi.org/10.3390/su11051297**

Liu et al. conduct a study to examine consumer preferences for organic coffee, focusing on sustainability-related certification attributes [48]. As consumer demand for healthy and sustainable food continues to grow, the authors aim to contribute to the promising literature on certification labels and their influence on consumer attitudes. They specifically attempt to address gaps in research regarding the environmental consciousness of consumers and how environmental concerns shape their purchasing behaviors. Liu et al. explore coffee certification attributes and how said attributes effect consumer demand, attention, and willingness to pay.

The study explores the impact of coffee certification attributes on consumer demand, attention, and willingness to pay (WTP). Data was collected though 650 questionnaires administered to individuals in Taiwan who regularly purchase coffee beans. After cleaning invalid responses, 568 questionnaires were included in the analysis. The majority of respondents were male (54.1 %), with the largest age group being 46-55 years old (31.2 %), followed by 36-45 years old (22.2 %). Most participants had a university education (57.2 %), were married (65.3 %), and had an average monthly income of 30,001-50,000 yuan (34.5 %)

The questionnaire was divided into three sections:

1. Respondents’ emphasis on five coffee certification attributes and their coffee purchasing habits.
2. Simulated purchasing decisions based on characteristics of coffee beans and WTP.
3. Socioeconomic background data.

Participants were asked to rank the certification attributes on a scale of 1 to 5, with 1 receiving the highest score (5 points) and 5 receiving the lowest score (1 point). Table 13 presents the average scores for each certification attribute.

**Table 13. Average scores per certification attribute**

| Attributes | Degrees | Attribute Preference |
|---|---|---|
| **Fair-trade certification** | Yes, no | 1.41 |
| **Organic certification** | Yes, no | 3.70 |
| **Eco-friendly certification** | Yes, no | 2.19 |
| **Grade certification** | Yes, no | 2.75 |
| **Traceability certification** | Yes, no | 4.95 |
| **Price premium** | 0, 2.5 %, 5 %, 7.5 %, 10 % | - |

To analyze the data, the authors construct a "coffee certification attribute utility model" using a choice experiment method (CEM). They employed multinomial logit (MNL) and random parameter logit (RPL) models to estimate utility functions to analyze preferences across respondents' socioeconomic backgrounds, including sex, age, education, marital status, and income. The RPL model captures variations in consumer preferences.

Key findings reveal that coffee certifications for country of origin, variety, altitude of origin, and sustainability labels positively influence price premiums. The authors also found that older respondents, as well as those with higher education and income levels, demonstrated higher WTP for coffee with grade certification. Respondents' WTP rankings for certification attributes, from highest to lowest, are as follows:

1. Traceability certification
2. Organic certification
3. Graded certification
4. Eco-friendly certification
5. Fair trade certification

The study aligns with prior research, showing that traceability and organic certifications are the most valued attributes, while fair trade certification is the least prioritized. Overall, the results indicate that consumers prefer coffee products with clear certification markings and traceable sources and are willing to pay a premium for these attributes. Liu et al. conclude that their work highlights the importance of understanding how consumer preferences influence the selection of coffee certification attributes, providing valuable insights for businesses and policymakers seeking to promote sustainability in the coffee market.

**Loureiro ML, Umberger WJ (2005) Assessing Consumer Preferences for Country-of-Origin Labeling. *Journal of Agricultural and Applied Economics* 37(1):49–63.**

Loureiro and Umberger assess consumer WTP for a mandatory country-of-origin labeling program applied to beef ribeye steaks, chicken breasts, and pork chops, all labeled as "Certified U.S." products [37]. The authors consider a requirement mandating retailers to provide consumers with country-of-origin labeling at the point of purchase for ground and whole-muscle cuts of beef, pork, lamb, seafood, peanuts, and fruits and vegetables. Regarding data collection, a consumer survey was mailed in the spring and early summer of 2003 to households in the continental United States. The survey collected information regarding respondents purchasing behavior and attitudes about beef products, along with sociodemographic characteristics. To elicit consumer WTP for three labeled meat products (Certified U.S. ribeye steaks, chicken breasts, and pork chops), the authors implement a set of dichotomous choice questions.

Results show that consumers are concerned about food safety issues, and view U.S. meat as the safest among the countries considered. Despite this, consumer WTP for Certified U.S. products is found to be relatively small, however it is still above the expected implementation costs that come with a mandatory labeling program. The authors suggest that a voluntary labeling program may be a better alternative since companies could target consumers that fall into the specific market demographics, such as those with a higher income, or individuals who are the primary shopper for their household.

**Loureiro ML, Umberger WJ (2003) Estimating Consumer Willingness to Pay for Country-of-Origin Labeling. *Journal of Agricultural and Resource Economics* 28(2):287–301.**

Loureiro and Umberger assess consumer willingness to pay for a mandatory country-of-origin labeling program. A consumer survey was conducted in several grocery stores in three different Colorado cities in 2002 with sociodemographic characteristics also being observed. Results from the study demonstrate that respondents are exceedingly concerned with source verification and labeling issues and consequently are willing to pay a higher premium for the mandatory COO labeling program [20]. They are also willing to pay more for U.S. Certified Steak and U.S. Certified Hamburger as represented in Table 14**.**

**Table 14. Willingness to Pay Estimates**

| Attribute | Steak labeled as "U.S. Certified Beef" | Hamburger labeled as "U.S. Certified Beef" |
|---|---|---|
| **Original Price** | $4.00/pound | $1.20/pound |
| **Mean WTP (premium value above the original base price)** | $1.53/pound | $0.70/pound |
| **Percentage premium** | 38.3% | 58.3% |

Considering sociodemographic characteristics, the results suggest that females, those who are the primary shopper in their household, and those who are most concerned about food quality and food safety issues are the most likely to support, and pay a premium for, mandatory COO

labeling. Loureiro and Umberger also find that surveyed respondents are WTP a statistically significant $183.77 premium per household annually for a mandatory COO labeling program.

**MacKerron G, Egerton C, Gaskell C, Parpia A, Mourato S (2009) Willingness to pay for carbon offset certification and co-benefits among (high-)flying young adults in the UK. *Energy Policy* 37(4):1372–1381. https://doi.org/10.1016/j.enpol.2008.11.023**

Voluntary carbon offsets allow individuals, businesses, and organizations to reduce their GHG emissions by funding projects that either mitigate or remove carbon from the atmosphere.

Mackerron et al. investigate consumer preferences for voluntary carbon offsets, particularly examining the impact of certification and co-benefits on willingness to pay (WTP) [52]. Using a combination of contingent valuation (CV) and choice experiments (CE), the study aimed to address the lack of clarity in the offset market regarding consumer valuations of offsets with varying attributes. Certifications in the study were categorized as government-based or uncertified, while co-benefits included human development, conservation and biodiversity, technology and market development, and the absence of co-benefits.

The study involved two types of valuation scenarios

1. Contingent Valuation (CV): Respondents could accept or reject a fixed price for a specific offset product
2. Choice Experiment (CE): Respondents selected from a range of offset options with varying attributes and prices.

The authors collected attitudinal, socio-economic, and demographic data, and included:

- A CV question using a split sample design to compare certified versus uncertified offsets
- Six CE scenarios that assessed valuations for offsets with and without certification and co-benefits

The study sample was restricted to UK adults aged 18-34 with higher education qualifications. Prior to full deployment, the survey was piloted with 20 volunteer respondents, followed by detailed cognitive interviews to refine the methodology. The survey used for data analysis was then completed by 321 respondents between February and March 2007. The sample was once again restricted to individuals aged 18-34 with a HE qualification.

The choice experiment reveals that voluntary offset adoption can be encouraged by investing in projects with co-benefits and by emphasizing these co-benefits to consumers. Certification was also shown to add value to offsets, potentially compensating for increased costs, provided that consumers are fully informed about the certification's significance. Among the co-benefits, biodiversity conservation was the most highly valued, while technology and market development was the least valued. All co-benefits were positively received by respondents, highlighting the importance of pairing carbon offset programs with additions environmental and social benefits.

The findings from MacKerron et al. underscore the role of certification and co-benefits in shaping consumer preferences for voluntary carbon offsets. By emphasizing these attributes,

organization can improve the perceived value of offsets and encourage greater participation in offset programs.

**Table 15. Average scores per certification attribute**

| Attribute | Levels |
|---|---|
| **Project co-benefits** | Human Development |
| | Conservation and biodiversity |
| | Technology and market development |
| | None |
| **Certification** | UK Government certified |
| | None |
| **Price (GBP)** | 4, 8, 12, 16, 20 |

**Magnier L, Mugge R, Schoormans J (2019) Turning ocean garbage into products – Consumers' evaluations of products made of recycled ocean plastic. *Journal of Cleaner Production* 215:84–98. https://doi.org/10.1016/j.jclepro.2018.12.246**

This paper investigates consumers responses to products made of recycled ocean plastic, focusing on issue awareness and attitudes. The authors draw on the theory of perceived risk to enhance their analysis while using a cost-benefit trade off approach to measure consumers' behavioral intentions towards products made of ocean plastic [56]. They specifically look at which perceived risk and benefits directly affect purchase intention and WTP a price premium.

Magnier et al. conduct an online quantitative survey of 258 Dutch consumers. The survey explores consumer attitudinal and behavioral responses towards ocean plastic products. Consumers evaluate three distinct product categories: durables, textiles, and fast-moving consumer goods (FMCG). Through cluster analysis, four sustainability groups are identified: experts, passive, benevolent, and indifferent. The results highlight variabilities in preferences amongst sustainability groups and across the different product classes.

The authors conclude that the consumers' willingness to pay a price premium for products made of ocean plastics is likely to be influenced by both perceived benefits (such as environmental benefits, anticipated conscience, and degree of recognizability) and perceived risks (reduced quality and functionality, limited attractiveness, value for money, general risks, contamination risks, and perceived safety). Balancing the perceived positive benefits against the negative perceived risks results in an individual's behavioral intentions, influencing their purchase intentions and WTP.

The paper identified anticipated conscience, value for money, perceived functionality, and risks of contamination as key predictors of consumers' purchase intentions. While anticipated conscience, value for money, and perceived functionality had a positive effect, the

perceived risk of contamination negatively impacted purchase intention. The report contributes to the broader understanding of consumer acceptance of recycled materials. It aims to guide companies in developing and promoting ocean plastic products to advance the circular economy. Findings suggest that while perceived risks of contamination and concerns about quality and functionality remained relatively low, their influence on purchase intention varied across sustainability groups. Consumers showed a higher WTP for textiles and fast-moving consumer goods compared to durable goods.

**Morone P, Caferra R, D'Adamo I, Falcone PM, Imbert E, Morone A (2021) Consumer willingness to pay for bio-based products: Do certifications matter? *International Journal of Production Economics* 240:108248. https://doi.org/10.1016/j.ijpe.2021.108248**

Morone et al. examine consumer purchase intentions for bio-based products in Italy, focusing on colored pens, food storage bags, and bar soap [50]. Their research includes an evaluation of products certified as sustainable, although the source of the certification is not specified. This study contributes to the growing body of literature on green purchasing behavior, a field that has gained significant traction as consumers become increasingly aware of environmental issues and more open to purchasing green products.

The study builds off previous research to measure consumers WTP for bio-based products, both with and without sustainability certification. The authors conduct an artefactual field experiment in April 2019 as part of the Horizon 2020-funded STAR-ProBio project. The experiment takes place in an Italian branch of a multinational retailer specializing in furniture, furnishing, and household articles. This setting was chosen as the branch attracted a diverse sample of customers and offered products at a variety of price points, thereby minimizing potential income-based sample bias. A total of 360 customers were approached after checkout, yielding 1080 observations. The questionnaire itself attempts to measure consumer preferences by applying two sets of questions:

- Collected socio-demographic data (i.e., age, education, employment, etc.).
- Elicited participants' WTP for conventional products, bio-based products, and certified bio-based products.

The experimental analysis uses a three-by-three framework, combining three products (colored pencils, food storage bags, and hand soap) with three product types (conventional, bio-based, and certified bio-based). The authors define two distinct pricing premiums, (1) the green premium, representing the increase in WTP when moving from conventional to bio-based products and (2) the certified green premium, representing the increase in WTP when moving from bio-based to certified bio-based products. Table 16 shows WTP results from the 3x3 experimental analysis.

**Table 16. WTP Results for Choice Experiment**

| Product | Conventional WTP | Bio-Based WTP | Certified bio-based WTP | Green premium | Certified green premium |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Colored Pens** | 2.1 euros | 3.1 euros | 3.2 euros | Statistically significant* | Not significant (p = 0.482) |
| **Food Storage Bags** | 1.4 euros | 2.9 euros | 3.3 euros | Statistically significant* | Statistically significant* |
| **Hand Soap** | 1.6 euros | 2.5 euros | 3.0 euros | Statistically significant* | Statistically significant* |

*Statistically significant results yield a value of $p < 0.05$

The experiment's results indicate that, across various product categories such as hand soap, food bags, and colored pens, the demand for conventional products tends to be more elastic than that for bio-based and certified bio-based products. Specifically, participants with lower WTP were less inclined to purchase bio-based products compared to conventional alternatives. However, there was statistically significant evidence showing an increased WTP a green premium for all bio-based products and certified green premium for all certified bio-based products, apart from colored pens.

The results also revealed that consumers showed enthusiasm for bio-based and sustainable products, particularly when they perceive these products as benefitting both their health and the environment. Consumers are more likely to choose these products over higher-quality alternatives that do not offer personal benefits. Morone et al. determine, through their comparison of bio-based products to non-bio-based products, that consumers attribute additional value to products made from natural resources [50].

**Nie YY, Liang AR-D, Wang EC (2022) Third-party certification labels for organic food: consumers' purchase choice and willingness-to-pay. *British Food Journal* 124(11):3993–4008. https://doi.org/10.1108/BFJ-07-2021-0777**

Nie et al. investigate the influence of organic certification labels from different third-party verification institutions on consumers' WTP for organic rice in Taiwan [49]. Using cue utilization theory, the study explores how certification labels impact consumer choice, focusing on the dual motivations of protecting the environment, and protecting human health. The authors selected rice as their subject due to its significance as a staple food in Taiwan and its important role in global food security.

Cue utilization theory separates cues into two categories: intrinsic and extrinsic. Intrinsic cues include inherent attributes such as taste and ingredients, whereas extrinsic cues serve as an evaluation of quality (such as packaging and labeling). In the context of Nie et al. paper, certification labels act as extrinsic cues that influence consumer perceptions of organic food quality. Nie et al. conduct an experiment involving 360 participants in Taiwan. Out of these 360 participants, 67.8 % were women, 61.9 % were married, and 54.2 % had a university degree.

Participants were presented with organic rice and certification labels from four different types of third-party verification institutions. These labels include foundations, associations, university certification centers, and private businesses. The study employs a choice experiment in which participants are presented with certified organic food, including product information and labels, and are asked to select their preferred product. The experiment features various

rice packaging sizes available at different price points. Participants are then asked to indicate their WTP for the products after viewing the labels from different third-party certification institutions.

The questionnaire is divided into three sections:

- Identifies each bag of rice with a number and includes questions regarding respondents' WTP.
- Contains three items designed to measure attitudes toward organic food labeling.
- Collects data on nine demographic variables and three items related to organic food purchasing behavior, including purchasing frequency, years as a buyer, and average amount purchased.

The experiment results reveal that consumers exhibited varying preferences and WTP for different certification labels, influenced by their purchase motivations (e.g., health versus environmental protection). When intrinsic cues, such as packaging, were held constant, consumer choices and WTP were significantly affected by the type of certification label issued by different third-party verification institutions. The study highlights that third-party certifications not only assist governments in developing and managing organic food markets, but also enhance consumer confidence. Consumers demonstrated the highest WTP for organic food certified by foundations and universities, while certification labels from private businesses were the least trusted. The authors state that this mistrust likely stems from concerns over profit-driven motives, which raise doubts about the fairness and legitimacy of private business certifications.

**Orset C, Barret N, Lemaire A (2017) How consumers of plastic water bottles are responding to environmental policies? *Waste Management* 61:13–27. https://doi.org/10.1016/j.wasman.2016.12.034**

Orset et al explore French consumer perceptions of plastic water bottles, focusing on their WTP for bottles made from various materials with differing recyclability, biodegradability, and environmental impact [14]. This investigation is particularly relevant given that the French are the third largest consumers of plastic water bottles globally, with 85 % of French citizens regularly drinking bottled water. The research was conducted that used a quota sampling method to select participants reflective of the French population's age, gender, and socioeconomic distribution. A total of 148 respondents aged 18 to 79 participated in the online survey. The study analyzes consumer preferences for a pack of six 1.5-liter water bottles, evaluating four different types of plastic: Polyethylene Terephthalate (PET), Recycled Polyethylene Terephthalate (r-PET), Polylactic Acid (PLA), and Polyethylene Furanoate (PEF). These materials were chosen as they allow the authors to compare the demand for bioplastics, recyclable plastics, and biodegradable plastics.

The survey follows a structured format. Participants first received an explanatory text to help them understand the study's purpose, through no specific information about the plastic

types was initially provided. They then answered questions about their sociodemographic background and consumption habits. The experiment incorporated eight rounds of WTP elicitation, where participants were sequentially exposed to different messages providing information about the bottles. These messages included details on price, resource use, biodegradability (in years), the presence of biomaterials, environmental impact, and recyclability.

To analyze the determinants of WTP, the authors use an ordinary least squares regression model with dummy and control variables. Results reveal that, on average, participants placed a higher value on biodegradable bioplastics and recycled plastics compared to recyclable bioplastics. The findings also reveal that respondents were highly responsive to the informational messages they received, with those placing significant importance on environmental protection resulting in a higher premium for r-PET and recycled products. Overall, the study found a notable premium associated with recyclable plastic and biodegradable bioplastic packaging. The authors also explored potential policy scenarios and their influence on consumer purchasing behavior and WTP, emphasizing the importance of encouraging sustainable choices through informed decision-making.

**Park S, Lim S, Yoo S (2018) Public willingness to pay a premium for uni-material beverage container in Korea: a contingent valuation study. *Water and Environment Journal* 32(2):229–234. https://doi.org/10.1111/wej.12318**

Park et al. assess the public's WTP a premium for uni-material beverage containers (UBC) in Korea, using bottled mineral water in PET containers as a case study [17]. UBCs are made entirely from a single material, with no liners or coatings, simplifying the recycling process and enhancing sustainability by eliminating the need to separate materials during recycling. While UBCs aim to increase recyclability and reduce waste management and landfill costs, they also result in higher production costs, leading to increased prices for consumers. At the same time, customer perceive no functional difference between UBCs and non-UBCs.

To quantify WTP, the authors conduct a discrete choice contingent valuation survey of 1000 consumers, using a beverage price surcharge as the payment vehicle. Participants were asked whether they would pay a specified premium for UBC mineral water over non-UBC, considering their household budget constraints and other expenditures. The average price of a 500 mL botte of mineral water in a non-UBC is KRW 1000 (0.88 USD), and the results showed that consumers were willing to pay an additional KRW 107 (0.09 USD) for UBCs. This represents a 10.7 % premium over the price of non-UBC mineral water, reflecting the public value of UBCs. This premium indicates that Korean consumers are willing to pay a significant premium for more sustainable containers. However, the study also found that 372 respondents (37.2 %) were not willing to pay any premium for UBCs. The authors take note that their model appropriately accounts for this segment of the population, highlighting variability in consumer preferences for environmentally friendly packaging.

**Polyportis A, Mugge R, Magnier L (2022) Consumer acceptance of products made from recycled materials: A scoping review. *Resources, Conservation and Recycling* 186:106533. https://doi.org/10.1016/j.resconrec.2022.106533**

Polyportis et al. aim to highlight the key factors that influence consumer preferences and acceptance of products made from recycled materials [57]. Through a review of existing literature, they focus on three main objectives: (1) identifying the drivers behind consumer acceptance of recycled products, (2) analyzing potential barriers to their adoption, and (3) offering recommendations for future research to better support the adoption of recycled material alternatives.

Their report is based on 46 selected articles, utilizing a scoping review approach, which, to the authors knowledge, is the first of its kind to comprehensively address consumer acceptance of all consumer products made from recycled materials. The articles are sourced from the Web of Science and Scopus databases, with the majority of studies relying on primary quantitative research to draw their conclusions.

Polyportis et al. conclude that key factors influencing consumer acceptance of recycled products include environmental benefits, perceived quality, safety, risks, emotions, and individual differences. Their conceptual framework is based on the Hierarchy of Effects Theory, which suggests that consumers experience a series of stages before arriving at their final purchase decision. This approach emphasizes the complex nature of consumer behavior and the multiple factors at play in the acceptance of recycled products.

The authors suggest that sellers focus on amplifying the emotional responses that consumers experience when purchasing and using recycled products, as this could improve their acceptance and appeal. The role of branding in purchase decisions can also be further explored, examining whether brand enhances acceptance through factors such as ethical corporate responsibility, brand trust, and positive consumer experiences, or diminishing it due to perceptions of greenwashing. Additionally, the authors raise the issue of an intention-behavior gap, which can be seen when comparing consumer stated preferences with their real-world buying habits. This discrepancy may be attributed to social desirability bias, which skews consumers expressed intentions away from their actual purchasing behaviors.

Polyportis et al. conclude the report with a section on suggestions for future research. They believe more work needs to be done in exploring how consumers recognize recycled products and identifying the types of information needed to enhance their acceptance. Another significant issue for consumers is perceived risk, such as concerns about contamination or product quality. More work can be done to identify mechanisms that can be used to alleviate perceived risk concerns for consumers. The authors also recommend exploring other research methods that can yield results with less social desirability bias.

**Pretner G, Darnall N, Testa F, Iraldo F (2021) Are consumers willing to pay for circular products? The role of recycled and second-hand attributes, messaging, and third-party certification. *Resources, Conservation and Recycling* 175:105888. https://doi.org/10.1016/j.resconrec.2021.105888**

Although previous research has demonstrated that individuals are willing to pay higher prices for products that contain environmentally friendly attributes, this relationship may not be applicable to products in the circular economy as they could possess perceived quality issues. Pretner et al. explore consumer WTP for circular products within an experimental setting [10]. They consider three conditions:

(1) Consumers WTP for garments that are made from either recycled fibers or are reused
(2) WTP when consumers are provided information about the circular product's reduced environmental impact
(3) WTP when the source of environmental information is third-party verified

Environmental information has the potential to guide consumers toward purchasing products with eco-friendly attributes and thus reduce negative environmental impacts. By providing consumers with environmental information, Pretner et al find that this positively increases their awareness of said issues and enhances their perceptions about the contributions of their purchasing decisions. More specifically, this provision of information increases consumers perceived behavioral control (PBC) and perceived consumer effectiveness (PCE). Pretner et al. suggest that consumers WTP for circular products also increases when they are provided with information about the environmental virtues of these products. However, consumers WTP for said environmental attributes is seen to be counterbalanced by their negative quality perceptions of recycled and secondhand products. The authors find that verification can help solve this problem, as it helps lower consumers level of perceived risk. Pretner et al. find that third party verification reassures consumers that the product they are purchasing is up to their quality standard and offers them intrinsic value.

To explore consumer WTP for circular products, the authors design two experiments: one focused on a garment made with recycled fibers and the other focusing on a secondhand garment. The garment they select for analysis is a hoodie. The experiments attempt to measure if and in what amount WTP varies in relation to the type of garment considered and level of information provided. Four samples were collected with two from the US and two from Italy. The two samples within each country were differentiated by the type of product they were asked about (second-hand, recycled).

The authors conducted a 1 x 3 between subjects' experiment with three groups: a control group, an experimental group exposed to an unverified environmental claim, and another experimental group exposed to an environmental claim verified by a third-party. The control group was included to assess whether the WTP for circular garments is lower than the WTP for conventional garments priced at $40/€40. Table 17 shows WTP results separated by country of origin and participant group for recycled hoodies, where Table 18 shows the same data in reference to second-hand hoodies.

**Table 27. WTP for hoodies made from recycled fiber**

| | Conventional Garment Reference | Control Group WTP | Unverified Environmental Information WTP | Verified Environmental Information WTP |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **United States** | $40.0 | $34.1 | $36.9 | $39.0 |
| **Italy** | €40.0 | €26.7 | €30.9 | €33.1 |

**Table 38. WTP for secondhand hoodie**

| | Conventional Garment Reference | Control Group WTP | Unverified Environmental Information WTP | Verified Environmental Information WTP |
|---|---|---|---|---|
| **United States** | $40.0 | $11.9 | $15.3 | $17.2 |
| **Italy** | €40.0 | €18.0 | €19.6 | €21.2 |

The results determine that all conditions register substantially lower levels of WTP compared to the $40/€40 reference price. This finding supports the idea that consumers WTP for circular garments is lower than their WTP for conventional garments. The only exception to this rule is the participant group from the United States that was exposed to verified environmental information and was asked to consider a hoodie made of recycled fibers. This group had a WTP of $39.0, making it the closest to the reference price of $40. This suggests that when consumers receive clear and reliable information about environmental benefits, their WTP for recycled fibers is moderately comparable to their WTP for garments made from virgin fibers. The findings also show that WTP is generally higher in the U.S. than in Italy regarding hoodies made of recycled fibers, whereas the inverse is seen for secondhand hoodies. The results showed that consumers WTP was much lower for second-hand products than for products made from recycled materials. The authors also analyzed WTP based on environmental concern, finding that individuals with higher concern demonstrated a greater WTP. In the U.S., this group showed a WTP exceeding that for products made from virgin materials, including the control group.

**Puspasari ED (2024) Willingness to Pay Analyse for Green Cosmetics Product in Malang City.**

Puspasari et al. attempt to discover the characteristics that green consumers possess in Malang, Indonesia [23]. The authors are also concerned with analyzing and identifying the estimates and percentage changes in prices that consumers are willing to pay for green cosmetics products. Data is collected from a survey of 100 respondents; consisting predominantly of women in the 26 to 35 age bracket who have previously used green cosmetics products. From here, descriptive analysis and the contingent valuation method are employed. Findings from the paper determine that the majority of individuals in the demographic setting represented in this study are willing to pay more for green cosmetics products. Specifically, price increases of 30.48 % for serum, 22.56 % for facial wash, and 36.57 % for sunscreen were observed.

**Radam A, Yacob MohdR, Bee TS, Selamat J (2010) Consumers' Perceptions, Attitudes and Willingness to Pay towards Food Products with "No Added Msg" Labeling. *International Journal of Marketing Studies* 2(1):p65. https://doi.org/10.5539/ijms.v2n1p65**

Radam et al. attempt to identify consumers' perceptions, attitudes and willingness-to-pay towards food products with "No Added MSG" labeling (monosodium glutamate) [26]. A close-ended questionnaire is conducted in Klang Valley, Malaysia yielding a total of 200 respondents. The authors employ the contingent valuation methods to determine consumers' willingness to pay for the consumption of "No added MSG" beef. A logit model was then used to estimate the premium that consumers were willing to pay for products containing "No Added MSG" labeling. Results from the paper demonstrate that the demand and consumption of products with "No Added MSG" labeling is high and increasing. Radam et al. identify gender, household size, household income, family member with children below the age of 12, price levels, and education level as the most significant factors that affect ones WTP for these types of products.

**Richartz C, Abdulai A (2022) The role of information in consumer preferences for sustainable certified palm oil products in Germany. *PLOS ONE* 17(7):e0271198. https://doi.org/10.1371/journal.pone.0271198**

Richartz and Abdulai examine consumer WTP for sustainable certified palm oil products in Germany, specifically chocolate cookies, and chocolate spread [46]. These products were selected based on market research conducted by the authors, which indicated that sustainability may play a role when it comes to purchasing behaviors associated with these products. Previous research indicates that consumers depend on reliable information, such as labels and certifications, to make informed choices and maximize their utility. Recent studies on palm oil suggest that consumers favor certification methods that effectively address transparency issues within the supply chain. The authors leverage this information to further explore and analyze the market for sustainable palm oil.

In addition to collecting consumer data, the authors gathered information from German companies that use palm oil in the production of their confectionary and chocolate products. Among these companies, only 4.6 % reported that another agricultural commodity could easily replace palm oil in their products. Notably, 84 % of these companies stated that they use certified palm oil, however the specific certifications varied across companies. When asked about the potential of transitioning to organic palm oil in the future, 46 % of the companies considered it likely or very likely and 54 % considered it unlikely or very unlikely.

The study uses a discrete choice experiment to analyze consumer preferences and WTP. To account for quantity effects, the choice experiment includes two different products with varying amounts of palm oil. Authors randomly sampled 460 respondents across Germany via postal contact between December 2019 and February 2020. The final distribution of questionnaires consisted of 46 % of respondents in the cookie group and 54 % of respondents in the spread group. The questionnaire also included basic questions on socio-demographic characteristics, attitudes towards sustainability, purchasing behavior, and price considerations.

Richartx and Abduali investigate the role of information interventions (education), RSPO labels (certification), and brand in shaping consumer preferences for sustainable palm oil. Although the study included both mass balance and segregated RSPO labels, only the segregated label is used in the experiment. Their findings reveal that the "organic" label yields the highest WTP among consumers, making it the most promising attribute for promoting

sustainable palm oil. Additionally, information interventions are also found to increase WTP for sustainability and reduces "attribute non-attendance." Table 19 shows WTP estimates separated by attribute and the role of information.

**Table 19. WTP separated by attribute and role of information**

| Attribute | Full Sample (WTP) | No Information Treatment (WTP) | Information Treatment (WTP) |
|---|---|---|---|
| **Organic** | 2.66 | 1.38 | 3.27 |
| **Brand** | 0.27 | 0.27 | 0.24 |
| **4-Level** | 0.94 | 0.39 | 0.62 |
| **RSPO** | 0.72 | 0.40 | 1.49 |

**Smith S (2015) Made in America: A Comparative Perspective on Country of Origin Labels for Manufactured Products in the United States and Canada. *California Western International Law Journal* 45(2).**

The paper examines the technical challenges in United States' country of origin labeling standards and argues for the adoption of a model with reduced ambiguity for businesses and consumers alike. Smith argues that U.S. country of origin label laws fail to maximize the benefits that these types of labels are meant to provide [38]. Rather, these laws create several drawbacks for businesses and consumers. There is a high level of ambiguity within these laws, of what constitutes COO, which poses issues for both manufacturers and businesses as they are left to predict whether or not their products will successfully comply.

Smith suggests the adoption of a differing labeling model that could increase consumer knowledge and further business and consumer interests. He specifically suggests creating distinctions in labels for products that contain differing levels of foreign content. By enforcing and producing labels with varying foreign content percentages, consumers would be given the most accurate product information possible. This system would allow individuals to gain insight to the origin of the overall product, along with its parts or subcomponents.

**Smith GC, Tatum JD, Belk KE, Scanga JA, Grandin T, Sofos JN Traceability from a US perspective.**

Smith et al. elaborate on the traceability systems surrounding food that are currently present in the U.S. They emphasize that the U.S. currently lags many countries in the development of traceability systems for food, particularly livestock, poultry, and their products [55].

The paper consists of a literature review focusing on varying components of traceability in the U.S. food industry. Smith et al. highlight a variety of different traceability characteristics in the livestock and poultry industries. The paper identifies the breadth, depth, and precision of current traceability systems while also exploring the relationship between traceability for surveillance of foreign animal diseases, traceability for biosecurity protection, and traceability

for compliance with international customers. The authors also explore traceability and its relationship with improving value-based marketing and minimizing product recalls.

Smith et al. conclude that as the U.S. continues to develop improved traceability capabilities, the breadth, depth, and precision of these systems are the core components of interest. These components are dependent on the characteristics of a firm's production process and traceability objectives [55]. The authors state that, at the time the literature review was conducted, the U.S. had not adopted any mandatory traceability systems. However, several voluntary systems are currently operating with new systems in development. Smith et al. stress that there are significant economic implications attached to mandatory and voluntary traceability systems. Particularly in the areas of animal and human health, international trade, and supply chain dynamics.

**Sogari G, Mora C, Menozzi D (2016) Factors driving sustainable choice: the case of wine. *British Food Journal* 118(3):632–646. https://doi.org/10.1108/BFJ-04-2015-0131**

Sogari et al. examine consumers' perceptions of sustainable wine by analyzing clusters of individuals based on three identification factors: beliefs about environmental protection, beliefs about sustainable wine certification, and attitudes toward sustainably labelled wine [9]. They also look at consumers WTP for these products while considering socio-demographic characteristics.

The authors begin by conducting an extensive literature review and qualitative analysis based on focus groups. The background research for the paper highlights an important finding: while consumers generally appreciate the idea of sustainable winemaking, they possess minimal knowledge about it. To address this gap, the authors collect data form an online questionnaire of 495 Italian wine drinkers. Factor analysis and cluster analysis is the conducted using a statistical software.

The final sample comprises 495 respondents, 62.8 % of whom are male, with a mean age of 39. Nearly 80 % of the participants are under 50, and the educational background of respondents is high, 62.8 % holding a first or second level university degree. To enhance the analysis, respondents are also categorized by their region of residence.

The questionnaire presents 16 statements and respondents are asked to rank their level of agreement on a five-point Likert scale. The factor analysis identified the three key factors that form the foundation of the study

- Beliefs about sustainable wine certification: Consumers perceptions of the reliability and importance of certifications for sustainable winemaking.
- Attitudes towards sustainable wine: How positively or negatively consumers view wine that is labeled sustainable.
- Beliefs about environmental protection: The extent to which consumer prioritize environmental sustainability in their purchasing decisions.

Sogari et al. found that the cluster analysis identified four different segments of consumers: well-disposed, not-interested, skeptical, and adverse [9]. The cluster analysis also confirmed that consumers with positive attitudes towards sustainable wine and strong beliefs in environmental protection showed higher WTP. These findings suggest that companies adopting

sustainability programs should target the correct demographic of consumers who value sustainable claims on wine labels.

**Szűcs V, Guerrero L, Claret A, Tarcea M, Szabó E, Bánáti D (2014) Food additives and consumer preferences: A cross-cultural choice based conjoint analysis. *Acta Alimentaria* 43(Supplement 1):180–187.** https://doi.org/10.1556/AAlim.43.2014.Suppl.25

Szűcs et al. explore consumer preferences for foodstuffs that possess food additives. Previous literature identifies that there are significant differences between countries regarding the level of consumer concern in connection with food additives [66]. To further investigate these differences, the authors test five hypotheses using a choice-based conjoint analysis in three European countries all possessing different risk perceptions for food additives. They consider three main attributes: preservatives (natural/artificial), packaging gases (contains/does not contain), and price (average based on market data/+10%/+20%). The authors find that "preservatives" had a significant importance on purchasing behavior, while "packaging gases" had lower importance on consumer shopping intention. Noticeable differences regarding concern for food additives are observed between the three countries studied, reinforcing ideas introduced in previous literature regarding variety in consumer beliefs and purchase intentions.

**Takahashi R, Todo Y, Funaki Y (2018) How Can We Motivate Consumers to Purchase Certified Forest Coffee? Evidence From a Laboratory Randomized Experiment Using Eye-trackers. *Ecological Economics* 150:107–121. https://doi.org/10.1016/j.ecolecon.2018.04.010**

Takahashi et al. explore consumer purchase behavior regarding certified forest coffee, specifically examining how factors such as consumer interest in environmental issues, information provision, and product labeling influence purchasing decisions [47]. The study contributes to the literature in three significant ways: first, by conducting a RCT to mitigate biases due to endogeneity; second, by using eye-trackers to analyze how different labels capture visual attention; and third, by measuring actual consumer purchasing behavior that incurs real costs, rather than relying on hypothetical WTP questions.

Building on framework presented by Grunert (2011), the authors develop hypotheses related to the purchasing behavior of certified forest coffee. Takahashi et al. create hypotheses for three of the six barriers that Grunert (2011) discusses: a lack of awareness, a lack of motivation, and failures to notice eco-friendly labels [47]. They hypothesize that these barriers impact the likelihood of consumers choosing certified forest coffee.

The authors conducted a laboratory experiment in Tokyo, Japan, with 246 respondents from Waseda University. Approximately half of the participants were female, with about 86 % of participants indicating that they liked to drink coffee, 30 % drinking it daily, about 11 % expressing a high level of environmental interest. Participants were randomly assigned to receive either a detailed explanation of the forest coffee certification program or no explanation, to assess whether a knowledge gap influenced purchasing behavior. In addition, each participant was shown one of four randomly selected product labels for certified coffee to

examine how variations in logo design, such as the inclusion of subtitles or illustrations, affects individuals' willingness to choose certified forest coffee.

The participants were presented with three different coffee varieties: certified forest coffee, regular coffee, and mocha coffee, along with a "no buy" option. The price of all coffees was fixed at 100 Japanese yen (around US $1), as this is the typical price of a cup of coffee provided by Japanese vending machines in the market, regardless of certification status. After completing this portion of the experiment, participants completed a questionnaire about their socio-demographic background, previous coffee purchasing experiences, and attitudes towards coffee and sustainability.

The authors conducted the experiment in two rounds. In the first round, participants made hypothetical purchasing decisions, while in the second round they were required to spend 100 yen. Participants could either spend the 100 yen on a coffee or select the "no buy" option, in this case they would receive the 100 yen. This approach is significant as it revealed a notable difference between participants stated WTP in a hypothetical scenario and their actual purchasing behaviors under real monetary conditions. Table 20 demonstrates the results from rounds 1 and 2 of the choice experiment.

**Table 20. Results from Choice Experiment**

| Product | Round 1 | Round 2 |
|---|---|---|
| **Regular Coffee** | 24 % | ~8 % |
| **Certified Forest Coffee** | 45 % | 40 % |
| **Mocha Coffee** | 20 % | ~16 % |
| **No buy** | 10 % | 36 % |

The authors make a valuable contribution to the existing literature by focusing on participants actual purchasing behaviors, which involve real monetary costs, rather than relying purely on hypothetical WTP scenarios. They found that providing participants with additional information on the certification program of forest coffee does not significantly affect consumers purchasing behavior towards this type of coffee. Findings also suggest that visual illustrations on the product labels of forest coffee can help boost consumer purchases on certified forest coffee. The study highlights the importance of effective marketing strategies in driving demand for certified forest coffee.

**Testa F, Gusmerotti N, Corsini F, Bartoletti E (2022) The role of consumer trade-offs in limiting the transition towards circular economy: The case of brand and plastic concern. *Resources, Conservation and Recycling* 181:106262. https://doi.org/10.1016/j.resconrec.2022.106262**

The paper explores the relationship between a set of key factors, including recycled material, brand loyalty, and concerns about plastic, to better understand their role in predicting consumer behavior [12]. The authors aim to examine how these individual behaviors interact and influence green consumption patterns. They examine the emerging tradeoffs in circular consumption, focusing on the tension between environmental attributes, such as concerns about plastic use and the appeal of recycled plastic materials.

Testa et al. formulate a questionnaire and conduct a 2 x 2 experimental study with a sample of 1000 individuals, representing the Italian and Spanish populations, aged 18 to 75 years. The authors examine purchase intention of respondents for a polyester backpack considering two materials: recycled and virgin. They also investigate the impact of branding (commercial branded product vs unbranded product). Data from the survey was then analyzed through structural equation modeling. After being exposed to the treatment, participants were asked to rate their agreement with various statements to assess their attitude toward the product, perceived quality, and purchase intention. The measurement of perceived quality was based on previous research. To evaluate attitudes, 9 items were developed, with respondents grading their opinions on a set of attributes using a 7-point Likert scale

The report finds that both recycled product and plastic concern significantly influence consumers' attitudes towards a product and its perceived value, ultimately shaping buying behaviors. The results indicate that while the use of recycled material in the backpack can increase purchase intention by improving customer attitudes and perceived value, these factors mediate the overall intention to buy. They also found that consumer concerns about plastic negatively affect this relationship by lowering attitudes toward recycled plastic products and diminishing their perceived value. Notably, brand influence had minimal impact on purchase decisions. The authors offer conclusions that give suggestions on how to develop green marketing campaigns and communication strategies to increase green behaviors amongst consumers.

**Umberger WJ, Feuz DM, Calkins CR, Sitz BM Country-of-Origin Labeling of Beef Products: U.S. Consumers' Perceptions.**

Umberger et al. elicit WTP for country-of-origin labeling of beef products. In June and July of 2002, consumers from Denver and Chicago were randomly recruited to participate in a study on beef quality [36]. Qualified individuals completed surveys elaborating on their meat-purchasing behavior, knowledge of beef, and sociodemographic characteristics. They were also asked questions regarding their preferences and WTP for different beef products with labels identifying the country-of-origin where the beef was produced. After the survey was conducted, a random nth price auction was performed where consumers were shown two steaks; one with a packaging label stating "U.S.A Guaranteed: Born and Raised in the U.S." and the other containing no label.

Survey results indicate that the majority of consumer (73%) were willing to pay a premium of 11% for COOL of steak and 24% for COOL of hamburger, respectively. Consumers were also observed to pay a statistically significant 19% premium for steak labeled "U.S.A Guaranteed: Born and Raised in the U.S." These statistics can be observed in Table 21 and Table 22**.** Findings indicate that the variables of *food-safety concerns*, *preferences for labeling source and origin information*, *a strong desire to support U.S. producers*, and *beliefs that U.S. beef was of higher quality* were the main reasons as to why consumers preferred beef with COOL.

**Table 21. Willingness to Pay for COOL for Steak and Hamburger**

| | Original price of unlabeled beef $/pound | Premium $/pound | % Premium | % Population WTP |
|---|---|---|---|---|
| **Steak** | $4.00 | $0.42 | 10.5% | 72.9% |
| **Hamburger** | $1.50 | $0.36 | 24.3% | 71.8% |

**Table 22. Population WTP Preferences for COOL**

| | % of Population |
|---|---|
| **Preference to purchase product with COOL** | 75% |
| **Indifferent preference** | 22% |
| **Preference to purchase unlabeled product** | 3% |

**Van Asselt J, Nian Y, Soh M, Morgan S, Gao Z (2022) Do plastic warning labels reduce consumers' willingness to pay for plastic egg packaging? – Evidence from a choice experiment. *Ecological Economics* 198:107460. https://doi.org/10.1016/j.ecolecon.2022.107460**

Although several pieces of existing literature have touched on consumer preferences and WTP for plastic water bottles, few have directly compared the WTP for plastic and non-plastic alternatives. The authors investigate how warning labels on plastic packaging affects consumer valuation for packaged food products, focusing on eggs in single use containers [35]. Eggs were chosen for evaluation as their packaging is in direct contact with the product, making them a relevant case for examining packaging-related consumer perceptions.

Van Asselt et al. utilize a choice experiment with a difference-on-difference design to investigate whether putting warning labels on plastic egg crates reduces consumers' WTP for plastic packaging. They apply a theoretical modeling approach based on random utility theory. The authors conducted the survey to obtain a panel of respondents that is nationally representative of the US consumer base. The study involved 813 respondents, divided into four groups: a control group (208 participants), and three treatment groups (201 in health, 201 in environment, and 203 in safety treatments). Demographic testing ensured a balanced representation across groups by age, gender, education, and income. To eliminate potential bias, all egg cartons were labels as "12 Grade A Large Brown Eggs," as different types of eggs are commonly packaged using different materials. The experiment tested the effectiveness of three warning labels in reducing plastic consumption: an environmental label (highlighting plastic's negative impact on ecosystems), a health label (focusing on plastic's harm to human health), and a safety label (combining environmental and health concerns). A control group with no label was also included. Additionally, the research evaluates consumer preferences across three different container types (plastic, cardboard, and Styrofoam) while also

considering egg attributes such as organic and free-range. Table 23 shows the levels of the choice experiment and their corresponding attributes.

**Table 23. Levels and Attributes from Choice Experiment**

| Attribute | Levels |
|---|---|
| **Packaging material** | Plastic |
| | Styrofoam |
| | Cardboard |
| **Cage Free** | Yes |
| | No |
| **Organic** | Yes |
| | No |
| **Product price** | $1.50/dozen |
| | $2.50/dozen |
| | $3.50/dozen |
| | $4.50/dozen |

The study demonstrates that warning labels are effective at reducing consumers' WTP for plastic and Styrofoam containers. Across all groups, warning labels significantly decreased WTP, with health and safety labels showing the greatest impact. However, the environmental warning label did not affect WTP for Styrofoam, possibly because many respondents were unaware that Styrofoam is a type of plastic. Respondents displayed a strong preference for clear plastic packaging over cardboard, but cardboard was preferred over foam. Interestingly, even with warning labels, there was a positive WTP for clear plastic packaging across groups, particularly in the control, health, and safety groups. In the second half of the choice sets, WTP for plastic decreased for treatment groups, suggesting that warning labels influenced consumer preferences, or that learning fatigue played a role. Consumers exhibited a strong preference for cage-free and organic eggs, and the analysis showed that warning labels on plastic egg cartons decreased WTP for eggs in plastic packaging by $1.02 when viewing all treatment groups collectively. Additionally, treatment labels were effective in reducing WTP for plastic and foam containers among consumers who were not already aware of or concerned about plastic environmental attributes (PEAs) or plastic health attributes (PHAs).

The authors suggest that placing a warning label on plastic packaging may be a solution to reduce consumer demand for single-use plastics when they are given the choice between plastics and more sustainable alternatives. The study shows that consumers are typically willing to pay more for eco-labels that indicate both private and environmental benefits in comparison to those that just boast environmental benefits as individuals are more concerned with the impact of packaging on their own health rather than the environment.

**Van Loo EJ, Caputo V, Nayga RM, Meullenet J-F, Ricke SC (2011) Consumers' willingness to pay for organic chicken breast: Evidence from choice experiment.** ***Food Quality and Preference*** **22(7):603–613. https://doi.org/10.1016/j.foodqual.2011.02.003**

The paper assesses consumers' willingness to pay for organic chicken breasts. Van Loo et al. attempt to explore this topic considering factors such as socio-economic demographics, frequency of purchase, and presentation of organic certification label [33]. They are specifically concerned about the differences in the WTP for chicken with a generic organic label versus a USDA certified organic label.

Van Loo et al. conduct a choice experiment using members of a representative consumer database (N=3900) in Arkansas, USA. Individuals were sent an email invitation to voluntarily participate in an online survey. In addition to the choice experiment, additional consumer perception and attitudinal questions were asked. By implementing a discrete choice experiment, the authors calculate which consumers are willing to pay extra and by how much when any of the two described labels are presented. It is necessary to note that in real buying scenarios, there may be additional interactions with factors that are not studied in the experiment. For example, brand name may have a large influence on consumer purchasing behavior of chicken breasts. For the sake of the experiment, Van Loo et al. assume that attributes outside of price and label (such as brand names) are the same in all product options.

The experiment results indicate that consumers are willing to pay an average premium of $1.19/lb or 34.8 % for chicken breasts with a general organic label, and an average premium of $3.55/lb or 103.5 % for the USDA organic label. The authors found that consumers' WTP also differs based on demographic group and how frequently they purchase organic meat products. For all buyer types regardless of demographic or purchase frequency, the USDA branded label outperforms the general organic label, indicating that consumers likely trust USDA branded organic products more than generic labeling. Table 24 outlines the premium percentage that consumers are willing to pay based on the labeling of the chicken and their frequency of purchase.

**Table 24. WTP based on labeling**

| Type of Label | Frequency of purchase | WTP premium |
|---|---|---|
| **USDA organic** | Non-buyer | 26.2 % |
| | Occasional buyer | 97.3 % |
| | Habitual buyer | 244.3 % |
| **General organic** | Non-buyer | -29.2 % |
| | Occasional buyer | 35.7 % |
| | Habitual buyer | 146.6 % |

**Van Loo EJ, Caputo V, Nayga RM, Verbeke W (2014) Consumers' valuation of sustainability labels on meat. *Food Policy* 49:137–150.** https://doi.org/10.1016/j.foodpol.2014.07.002

Van Loo et al. collect data through a cross-sectional consumer survey in Northern Belgium [29]. The survey targets the main person in the household who is responsible for food purchasing with the total sample size consisting of 359 participants. Sixty percent of these

individuals were female with authors ensuring adequate representation of each age category as well as varying household compositions. The authors then conduct a choice experiment to investigate consumer preferences and WTP for a set of sustainability claims on chicken breasts. The authors chose specific attributes to compare chicken breasts, all relating to consumer valuation of sustainability labels. These attributes included: organic label, EU animal welfare label, free range claim, carbon footprint label, and price.

The authors use an estimation model based on 2872 observation (359 individuals each performing eight choice tasks per person), with three options per choice task, giving a total of 8616 alternatives to be evaluated. The findings from the model demonstrate that almost 19 % of consumers have positive preferences towards each of the eight sustainability labels, suggesting that consumers appreciate being informed about the sustainability characteristics of their food through labeling. Considering socio-economic data, the study also confirms the idea that income has a significant effect on ones WTP for organic food and organic meat.

**Zhang C, Bai J, Wahl TI (2012) Consumers' willingness to pay for traceable pork, milk, and cooking oil in Nanjing, China. *Food Control* 27(1):21–28. https://doi.org/10.1016/j.foodcont.2012.03.001**

The authors analyze consumers' WTP for traceable food products—specifically pork, milk, and cooking oil—and examine the factors influencing this behavior, with a particular emphasis on the role of consumer knowledge [54]. They use data from Nanjing, China to provide important insights into the relationship between food traceability systems and consumer purchasing behavior.

Traceability refers to the ability of firms or supervising agencies to track the origin and movement of a product throughout the supply chain. Effective traceability systems enhance supply chain management by improving distribution efficiency, enabling product differentiation, and ensuring higher food quality and safety.

To gather data, the authors conduct a consumer survey using a single-bounded dichotomous choice contingent valuation method (CVM) to elicit WTP. The survey, conducted in October 2009, included 260 household from six districts in Nanjing, of which 247 responses were deemed usable for analysis. To explore the impact of consumer knowledge on WTP, the authors divided respondents into two groups: a treatment group that received an informational sheet about food traceability and its features, and a control group that received no additional information. Participants were then asked three dichotomous choice WTP questions regarding traceable pork, fluid milk, and cooking oil. In addition to these questions, demographic information about respondents and their household were also collected.

The study's findings reveal that consumers are willing to pay a significant price premium for food traceability, although the level of WTP varies across the three product categories. Table 25 shows the percentage of subjects that are willing to purchase traceable food. Consumer knowledge was identified as a key factor influencing WTP. The data also reveals a strong, positive relationship between consumer awareness of food safety and quality certifications and their WTP for traceable food products. This relationship was consistent across all three variables (pork, milk, and cooking oil). Zhang et al. also found that respondents with higher levels of education and per capita income demonstrated a greater likelihood of purchasing

traceable food products. The study underscores the potential for traceability systems to not only improve food safety but also drive consumer demand, particularly when efforts are made to increase awareness and understanding of these systems.

**Table 25. Individuals WTP for Traceable food**

| | Control Group | | | Treatment Group | | |
|---|---|---|---|---|---|---|
| Variable | Pork | Milk | Oil | Pork | Milk | Oil |
| Overall WTP % | 69.5 % | 60.0 % | 52.5 % | 85.7 % | 78.0 % | 77.2 % |

**Yamaguchi K, Takeuchi K (2016) Consumer preferences for reduced packaging under economic instruments and recycling policy. *Waste Management* 48:540–547. https://doi.org/10.1016/j.wasman.2015.11.015**

Yamaguchi and Takeuchi evaluate consumers' willingness to pay for products with reduced packaging in Japan [16]. They investigate whether policies enforcing unit-based pricing (UBP) for waste disposal can encourage higher WTP for such products. Their study specifically compares consumer preferences between a standard plastic bottle of shampoo and a refill pack made of plastic film.

The study is conducted using a web-based survey and a bidding game with the contingent valuation (CV) method to evaluate consumer preferences for products with reduced packaging materials. The survey, conducted in December 2010 in Japan, gathered responses from 2411 individuals aged 20 to 69 years, with 1908 valid responses used for analysis. The survey consists of four sections: (1) respondents' daily shopping behavior, (2) CV questions related to reduced packaging, (3) questions addressing factors that might influence respondents' WTP, and (4) questions related to socio-demographic characteristics. In the CV section, participants evaluated two identical shampoo products, both priced at 500 yen, with equivalency in their quality and quantity. However, the two products differed in their packaging, with one in a bottle and the other in a refill pack. This comparison aims to assess consumer preferences and WTP for reduced packaging.

The authors attempt to determine whether a policy enforcing strict unit-based pricing of waste could encourage higher WTP for such products. Previous research highlights that purchasing commodities with less material is a critical way to practice source reduction of waste. Using a stated preference approach, which elicits hypothetical WTP for market goods, the study examines the economic value of reduced packaging, exploring demand and price competitiveness for these products relative to conventional packaging

The findings show that individuals who live in municipalities with unit-based pricing (UBP) for waste exhibit a higher willingness to pay (WTP) for products with reduced packaging. The authors explain that economic instruments like UBP increase the attractiveness of source reduction due to higher disposal costs. However, when UBP is combined with plastic separation for recycling, WTP decreases, suggesting that recycling policies can weaken the effect of economic instruments on waste reduction. The results highlight that consumer WTP for less packaging is generally low, with many choosing refill packs more for their lower price than for

environmental reasons. Refill packs are often perceived negatively due to their appearance and the inconvenience of refilling shampoo. The average WTP for eco-friendly packaging is estimated at approximately 2.5 Japanese yen based on the initial bid. The authors also find an interaction between waste policy and green marketing concluding that UBP policies increase WTP for refill options. However, if the refill option is priced low enough to attract even consumers with a lower WTP, additional incentives through UBP policies may not be necessary. These findings provide insights into promoting eco-friendly products and understanding consumer behavior toward sustainable packaging.

**Yeh C, Hirsch S (2023) A meta-regression analysis on the willingness-to-pay for country-of-origin labelling. *Journal of Agricultural Economics* 74(3):719–743.** https://doi.org/10.1111/1477-9552.12528

Yeh and Hirsch conduct a meta-regression analysis to examine consumers' willingness to pay for country-of-origin labeling. A total of 204 estimates were extracted from 59 primary studies which utilized discrete choice experiments. These estimates look at willingness to pay for country-of-origin labeling and find that, in general, a significant positive premium exists. Yeh and Hirsch identify through their meta-regression that factors such as the region and product analyzed (animal vs. plant-based) along with the characteristics of the choice experiment design (e.g., the number of attributes used, or the inclusion of an opt-out option) can have a significant influence on the results for estimated WTP on COOL [18]. There are also significant differences in price premiums observed between domestic and foreign COOLs.

Results based on the meta-regression model reveal a significant and positive coefficient for the *Focus on domestic COOL* variable. This positive value indicates that consumers' WTP for COOLs is higher on average (by 31 percentage points) when an option is labelled with domestic COOL information rather than generic COOL information in the discrete choice experiment design. However, there is a significant and negative coefficient detected for the variable of *Focus on foreign developing country*. The negative coefficient attached to this variable indicates that consumer WTP for COOL is lower (by 65 percentage points) when the COOL refers to a foreign developing country compared to generic country-of-origin information. These results confirm findings from previous literature that consumers tend to be willing to pay more for domestic products in comparison to their foreign alternatives.

Through calculating the simple mean of the 204 WTP for COOL estimates, Yeh and Hirsch find that, on average, consumers are WTP a premium of 26 % for COOL. Results from the full meta-regression analysis indicate that WTP for COOL is positive under most combinations. There is not presence of publication bias, however the authors observe that WTP estimates vary considerably depending on the characteristics of a study's choice design. Overall, results from the paper indicate that the magnitude of WTP effects is influenced by certain characteristics of the choice design and the experimental setting.

**Zhong Y, Wu L, Chen X, Huang Z, Hu W (2018) Effects of Food-Additive-Information on Consumers' Willingness to Accept Food with Additives. *International Journal of***

***Environmental Research and Public Health*** **15(11):2394.**
https://doi.org/10.3390/ijerph15112394

Zhong et al. seek to determine if information on both positive and negative food additives influences consumers' risk perception and their willingness to accept food with additives. The authors examine consumers' willingness to accept food additives through a random nth-price auction method of exchanging orange juice without additives for orange juice with additives. The experiment was performed in Suzhou City, China with a total of 310 participants and 298 valid samples. Participants were separated into two groups with Group A (150 participants) being provided with positive information on orange juice additives followed by negative information, and Group B (148 participants) being provided the same information in the opposite order. Findings show that the variables of age, education, income, satisfaction of food safety, and knowledge of food additives are the main contributors that affect consumers' willingness to accept additives when there is no information treatment. The authors also identify a negativity bias amongst consumers, "with negative information on orange-juice additives being given more weight than positive information" [25].