



How does consumer knowledge affect environmentally sustainable choices? Evidence from a cross-country latent class analysis of food labels



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ABSTRACT

This paper examines consumers' knowledge and lifestyle profiles and preferences regarding two environmentally labeled food staples, potatoes and ground beef. Data from online choice experiments conducted in Canada and Germany are analyzed through latent class choice modeling to identify the influence of consumer knowledge (subjective and objective knowledge as well as usage experience) on environmentally sustainable choices. We find that irrespective of product or country under investigation, high subjective and objective knowledge levels drive environmentally sustainable food choices. Subjective knowledge was found to be more important in this context. Usage experience had relatively little impact on environmentally sustainable choices. Our results suggest that about 20% of consumers in both countries are ready to adopt footprint labels in their food choices. Another 10–20% could be targeted by enhancing subjective knowledge, for example through targeted marketing campaigns.

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1. Introduction

Many dimensions of sustainability are relevant for socio-economic policy making related to ecological issues, including the economic, societal and environmental pillars (Krajnc & Glavič, 2005; Seghezze, 2009). In this regard, consumers are mainly concerned with favorable economic outcomes and the environment, i.e., environmental sustainability (Choi & Ng, 2011). Given personal and environmental consequences of choosing sustainable products (e.g., IPCC, 2007), it is important for society and policy makers to better understand reasons underlying environmentally responsible consumer behavior. For example, recent research shows that many consumers are displaying an increasing awareness of and preferences for environmental sustainability, as well as an increased willingness to pay for socially and environmentally responsible

products (Tully & Winer, 2014). Nevertheless, research is lacking as to what drives such preferences and willingness to pay. In other words, better understanding of the drivers of consumer choices associated with environmentally labeled products is needed. This paper aims to analyze the role of consumer knowledge (objective, subjective, and usage experience) regarding environmentally sustainable behavior, providing evidence from latent class analysis of preferences towards selected sustainability labeled food products, based on investigations in Canada and Germany.

Sustainability food labels have mainly been developed around the ecological footprint concept of Rees (1992) that includes both the amount of CO₂ created (carbon emission) and water used during production, processing, storage, packaging and distribution. The footprint concept provides an intuitive framework for understanding the ecological bottom-line of sustainability (Rees & Wackernagel, 1996; Wackernagel & Rees, 1997). A rapidly expanding literature has provided water and carbon footprint assessments with corresponding consumer and producer perspectives (e.g., Chapagain, Hoekstra, Aldaya, & Mekonnen, 2011; Finkbeiner, 2009; Grunert, Hieke, & Wills, 2014).

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To date, a number of countries and retailers have established pilot projects in support of the reduction of carbon emissions by providing information through product labeling. The first footprint labels were introduced in 2007 in the UK (Economist, 2011), followed by the introduction of the first carbon footprint label in food retailing by Tesco in 2009. Tesco cooperated with the Carbon Trust to implement the carbon footprint but discontinued labeling products in early 2012 when it became clear that shoppers were unwilling to pay premiums for labeled products and competitors did not follow suit in labeling their products (Financial Times, 2012; Upham, Dendler, & Bleda, 2011). Consequently, even though a majority of individuals were found to favor carbon labeling and agreed that this should be mandatory (72% of EU citizens) (Minx, 2007; Upham et al., 2011), there are only a few footprint labels that have continued in the marketplace (e.g., Powers, 2011; Stancich, 2011).

Our research extends previous work (e.g., Grunert et al., 2014; Grunert, Scholderer, & Rogeaux, 2011; Mesías Díaz, Martínez-Carrasco Pleite, Miguel Martínez Paz, & Gaspar García, 2012) by accounting jointly for consumers' subjective and objective sustainability knowledge as well as for usage experience (e.g., with regard to previous "green" purchases) in the context of food choices. Furthermore, our choice of products allows us to assess possible differences in consumer responses for two staple food products by analyzing consumers' choices for ground beef and potatoes labeled for environmental sustainability, using the example of carbon and water footprints. We contribute to the literature of sustainable food choices by identifying consumer segments in North America (Canada) and Europe (Germany) regarding a variety of characteristics, such as membership in environmentally active groups. Finally, we extend single-region focused literature by accounting for differences in choice behavior across Europe and North America, thereby contributing to the literature that has focused on cross-cultural comparisons (Loose & Remaud, 2013). Specifically, the Canadian study was replicated with German consumers to assess possible regional differences. Our results show that it is important to use a segmenting approach to analyze choices. We include psychometric and demographic variables in latent class choice models, to identify meaningful differentiations between segments (Boxall & Adamowicz, 2002), and to provide novel insights on the underlying reasons for low self-reported experience, complementing previous conjoint-based analyses (Grunert et al., 2014).

From a marketing and policy perspective, we derive implications for information provision and suggest target groups that can be addressed through distinct marketing strategies.

The remainder of the paper is structured as follows. The next section reviews relevant literature, followed by an outline of the methodological approach. Subsequently we present the estimation results and finish with a discussion and conclusions.

2. Literature

2.1. Environmental sustainability labels

The focus of our paper lies on environmental sustainability food labels considering in particular ecological footprints for carbon emission and water usage. Carbon emission and water usage are credence characteristics that can usually not be verified by the consumer at the point of purchase (Darby & Karni, 1973). One way to turn such credence quality attributes into search quality attributes (that can be perceived by consumers) is the use of environmental sustainability labels, which provide footprint information. However, there is a distinction between different labeling schemes. While consumers nowadays are relatively familiar with labels such

as the nutrition facts panel, they are rather unfamiliar with the primary unit of carbon labeling, lacking commonplace experience that would enable them to contextualize CO₂ equivalents (e.g., Hartikainen, Roininen, Katajajuuri, & Pulkkinen, 2014; VanLoo, Caputo, Nayga Jr, & Verbeke, 2014). The level of consumer awareness and understanding related to carbon labeling therefore more closely resembles that found in eco-labeling (e.g., Teisl, 2003) or ethical labeling, rather than in nutritional labeling (Upham et al., 2011). Interestingly, studies usually find a high degree of self-reported use of nutrition labels but only a low observed use of nutrition labels (Grunert, Fernández-Celemín, Wills, Storcksdieck Genannt Bonsmann, & Nureeva, 2010). With regard to environmental labels, consumers generally report not using them in the first place (Grunert et al., 2014). This raises the question of whether labels carrying specific information, such as carbon and water footprints, could be an alternative to more general environmental labels in order to support sustainable consumer behavior.

The literature on environmental sustainability labels has improved understanding of various different drivers that may lead consumers to choose such labels and corresponding products. Schumacher (2010) has shown that consumers' stated preferences for eco-labeled goods increase with environmental consciousness and decrease with price-orientation. Some studies have linked individuals' values to their preferences for footprint labeled foods (e.g., Grebitus, Steiner, & Veeman, 2013; Grebitus, Steiner, & Veeman, 2015). Kempton (1991) demonstrates that consumers' desire to preserve the environment for one's descendants is a key concern to U.S. consumers when choosing products carrying eco-labels. However, knowledge levels and understanding of environmental labels have been found to be low, which could deter adoption of these labels when making food choices (Grunert et al., 2014). To address this issue, we investigate consumer sustainability knowledge, namely subjective and objective knowledge as well as usage experience.

2.2. Carbon and water footprint labeling

Water usage footprints have been investigated for various products and markets, including global cotton consumption (Chapagain, Hoekstra, Savenije, & Gautam, 2006), coffee and tea (Chapagain & Hoekstra, 2007), pork (Galloway et al., 2007), tomatoes (Chapagain & Orr, 2009), as well as pasta sauce and candy (Ridoutt & Pfister, 2010), suggesting widespread interest in the application of this labeling concept. Research related to carbon labeling includes a food-based labeling survey of Japanese undergraduate students (Kimura et al., 2010), suggesting that willingness to pay is higher if information has to be obtained actively. Recent carbon label studies have been conducted on locally grown fresh apples, applying an equilibrium displacement model on US consumer responses to labels (Onozaka, Hu, & Thilmany, 2015), and a double bounded dichotomous choice analysis for fluid milk and bread in Chile (Echeverría, Moreira, Sepúlveda, & Wittwer, 2014). Closest to our analysis are two articles that focus on the power of human values to predict Canadians' choices of unprocessed ground beef products labeled for environmental footprints (Grebitus et al., 2013), and Germans' choices of potatoes labeled for environmental footprints related to human values and trust (Grebitus et al., 2015). Although those articles also employ attribute-based choice experiments, they differ from this analysis in focusing on only one country and one product, while considering only individuals' value orientation and trust, rather than focusing on the role of other psychometric variables and assessing groupings of consumers with similar preferences as consumer segments. Our focus on the two selected countries and staple foods was primarily motivated by our goal to analyze the robustness of our predictions, irrespective of the

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