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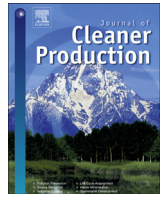
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Market segmentation of consumers based on their actual sustainability and health-related purchases

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ABSTRACT

Previous research on sustainability and health-related product labels has sought to develop segmentation frameworks based on consumers' self-reports. However, consumers are likely to overstate the effect that these labels have on their purchasing behavior. Moreover, existing consumer segmentation frameworks do not distinguish among product labels based on whether they offer public benefits (e.g., environmental benefits, animal welfare, social equity) vs. private benefits (e.g., cost savings, health benefits) vs. both. This article addresses these gaps by 1) developing a consumer segmentation based on consumers' actual purchases of sustainability and health-related products and 2) differentiating product labels based on the benefits they offer – public, private or both. Using cluster analysis, it assesses the actual daily consumption of 132 Italian consumers over 30 months and more than 370,000 transactions. The results indicate three segments of consumers: collectivists, individualists and indifferents. Moreover, the findings show that consumer segments are affected differently depending on whether a product label promises either public benefits, private benefits or both.

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1. Introduction

Sustainability and health-related labels are information tools that differentiate products based on their sustainability and health attributes (Nuttavuthisit and Thøgersen, 2017; Tarkiainen and Sundqvist, 2005). Products bearing these labels are considered credence goods because consumers cannot verify their sustainability and health-related claims through search or experience (Caswell and Mojduszka, 1996). Additionally, consumers cannot determine the product's attributes even after they buy and consume it (Caswell and Mojduszka, 1996). Since the sustainability and health-related attributes offer value to some consumers, the labels help them make informed purchasing decisions (Caswell, 1998). They also increase consumers' confidence in products' sustainability and health-related claims (Cai et al., 2017; D'Souza et al., 2006; Hartmann and Apaolaza-Ibanez, 2009).

Sustainability and health-related labels are increasingly endorsed by governments and NGOs as mechanisms to enhance public goods associated with the purchase of more socially beneficial products (Atkinson and Rosenthal, 2014; Darnall et al., 2012). Such endorsement is one reason why these labels have expanded significantly (Albayrak et al., 2010; Grunert et al., 2014), spanning in 199 countries and 25 industry sectors (Ecolabel Index, 2017). However, despite their increasing growth (Castaldo et al., 2009; Darnall et al., 2012), little is known about the extent to which different consumer segments are influenced by sustainability and health-related labels.

Previous research suggests an increasing prevalence of consumers that self-report having sustainability or health-related preferences (e.g., Ha and Janda, 2012; Kim and Chung, 2011; Krystallis and Chrysosoidis, 2005; Paul and Rana, 2012). There are at least two limitations to these studies (Pearson et al., 2011; Thompson, 1998): the existence of an attitude-behavior gap (Davies et al., 2002; Peattie, 2001), and the tendency that some individuals respond in a socially desirable manner (Fisher, 1993; Schwarz, 1999).

The first limitation relates to the tendency that consumers over-report their more socially acceptable purchasing behaviors

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(including purchases of sustainability and health-related products) and underreport their less socially acceptable purchasing behaviors (Auger and Devinney, 2007; Magnusson et al., 2001; Vermeir and Verbeke, 2006). Variations between self-reports and actual behaviors may also be due to contextual factors such as the availability of products, information, and awareness, time restrictions, and personal capabilities (such as financial resources) (Guagnano et al., 1995; Stern, 2000; Castro, 2015; Chekima et al., 2017; Fischer et al., 2017). Detecting these variations is problematic, especially when self-reported data are collected from the same source (Podsakoff et al., 2003). As a consequence, existing segmentation studies that assess aspects of consumers' self-reported purchases (e.g., NMI, 2010; Angelini et al., 2012), are likely to over-represent consumers' sustainability and health-related purchasing behaviors. Many studies acknowledge these concerns as a limitation and have called for future consumer segmentation research assessing actual behavior (Chan and Lau, 2000; Matthes et al., 2014; Moser, 2015; Thompson et al., 2010). However, such research is limited, most likely because of difficulties related to obtaining data on consumers' actual purchases.

A second limitation of existing studies is that prior consumer segmentation frameworks – namely consumer segments aimed at identifying similar consumption characteristics and patterns among individuals – have categorized consumers' sustainability and health-related orientations based on individuals' macro/micro motivations (Prothero et al., 2010), socio-demographics (Chan, 1999; Jain and Kaur, 2006; Roberts, 1996; Verain et al., 2012), cognitions (e.g., Grunert and Juhl, 1995; do Paço et al., 2009; Thompson et al., 2010; Verain et al., 2012) and lifestyles (e.g., Kucukemiroglu, 1999; NMI, 2008). However, many sustainability and health-related product labels vary by the sorts of benefits they offer consumers. Some products offer more public benefits from improved environmental outcomes, animal welfare, or social equity, whereas others offer more private benefits in the way of cost savings or improved health. Still other labeled products offer both benefits. These factors are likely to influence consumers' purchasing decisions with some types of consumers focusing their purchases on labeled products that offer more public benefits and other types of consumers focusing their purchases on labeled products that offer more private benefits. Still other consumers may be driven by labels with both types of benefits, whereas others may not be influenced by labels at all. These variations have important implications for understanding the market segmentation of consumers' actual sustainability and health-related expenditures.

This research answers the question of whether there are different segments of consumers exist when considering actual purchases of products bearing sustainability and health-related labels. It develops a consumer segmentation framework that compares consumers' purchases of sustainability and health-related products to non-labeled products and differentiates labeled products based on the benefits they offer – public, private or both. It applies cluster analysis to a unique sample of 132 Italian consumers' 370,000 food and non-food purchases that were monitored over 30 months. The analysis examines consumers' purchases across five categories of product labels: social equity, ecological, health products, organic, and vegan. After multiple robustness checks, the findings confirm that there are three segments of consumers (collectivists, individualists and indifferents) and these consumers are influenced differently based on the benefits that product labels convey.

These results significantly extend our knowledge of consumers and product labels, and are relevant to researchers of consumers' sustainability and health-purchasing behaviors. The findings are also applicable to firms that seek to promote their sustainability and health-related products because they offer information about

the size of different consumer segments that purchase labeled products and the extent to which these consumers are influenced by the different benefits they offer. Such information can help firms brand their sustainability and health-related products more appropriately.

2. Literature review

2.1. Sustainability and health-related product labels

Product labels are designed to convey intangible information in order to guide consumers' purchasing decisions (Daugbjerg et al., 2014; Testa et al., 2015; Truffer et al., 2001; Zepeda et al., 2013). The growth of these labels has increased significantly in recent years (Potts et al., 2014). By 2017, there were more than 465 in existence (Ecolabel Index, 2017; Darnall et al., 2017), as compared to 12 in 1990 (Delmas et al., 2013). These labels span 25 industry sectors, including food, clothing, cosmetics, furniture, tourism, energy (Ecolabel Index, 2017).

With respect to the market growth for labeled products, for organically grown food, in 2014, the European Union (EU) market for organics grew 7.4 percent (IFOAM, 2016), and in Italy, during the same year, organic food sales increased by 15 percent (OsservatorioSana, 2016). Similarly, at the global level, in 2015, sales of Fairtrade International labeled products for bananas, coffee and cocoa increased by 12, 18 and 27 percent, respectively (Fairtrade International, 2016).

The premise behind these product labels is that consumers generally lack information about products' sustainability and health-related characteristics, even though many producers have access to the information. These information asymmetries create market inefficiencies (Alchian and Demsetz, 1972), because they enhance consumers' perceived risk towards purchasing sustainability and health-related products and make it more difficult for consumers to identify a product's benefits (Chen and Chang, 2012; Mishra et al., 1998). This situation is problematic for consumers because it leads to suboptimal purchasing decisions, especially for individuals who would prefer to purchase sustainability and health-friendly products (Darnall and Aragon-Correa, 2014).

However, information asymmetries are also problematic for firms that wish to sell socially responsible products. In the absence of a label, there is no mechanism for businesses to differentiate their sustainability and health-related products from competing products. The outcome is that firms are less likely to develop and promote socially responsible goods (Darnall and Aragon-Correa, 2014). While firms can communicate information about their products' sustainability and health-related virtues in the absence of a product label, customers tend to believe that companies selectively disclose information about their products (Cai et al., 2017; Oates et al., 2008; Darnall et al., 2016), and exaggerate their environmental claims (Shahrin et al., 2017). For instance, a recent European Commission study finds that only 2 percent of Europeans trust companies as a source of information on environmental issues (European Commission, 2014).

Sustainability and health-related labels act as a means to address these information asymmetries (Van Amstel et al., 2008) by way of symbols that are displayed prominently on products. Products that qualify for these labels typically must meet externally determined criteria such as third party certification (Darnall et al., 2017) and help increase consumer confidence in a product's (and a company's) sustainability and health-related claims (Nuttavuthisit and Thøgersen, 2017; Tarkiainen and Sundqvist, 2005).

2.2. Sustainability and health-related product labels and consumer segmentation

Previous research has examined how consumers respond to sustainability and health-related labels by way of four types of segmentation frameworks. These frameworks are distinguished by their focus on consumers' macro/micro motivations, demographics, cognition, and lifestyles.

In the first of such frameworks, scholars segment consumers based on their buying motives (e.g., Hüttel et al., 2018; Prothero et al., 2010). Studies within this framework suggest that consumers may be encouraged to purchase sustainability related products for broader societal (macro) reasons, such as supporting social equity and ethical consumption, or for more personal (micro) reasons, such as supporting local businesses or individual concerns related to personal or family health. For instance, related to organic foods, at a macro-level, consumers express societal and environmental concern because these foods are regarded as having fewer negative impacts to the environment and animals (Kareklas et al., 2014). At a micro level, consumers often regard organic labeled food as being safer and healthier (Kareklas et al., 2014). By contrast, consumer purchases of social equity products, such as fair trade products, are generally motivated for macro reasons only, such as a wish to respect human rights and support fair wages (de Ferran and Grunert, 2007; De Pelsmacker et al., 2005; Ladhari and Tchetchna, 2015).

In the second prominent segmentation framework, scholars distinguish consumers based on their demographics. Studies within this framework indicate that individuals' gender, age, income, level of education, occupation, number of children, social class and place of residence are all predictors of why consumers report purchasing sustainability and health-related products (Chan, 1999; Diamantopoulos et al., 2003; Roberts, 1996; Jain and Kaur, 2006; Verain et al., 2012). These studies suggest that consumers who purchase these labeled products tend to be better educated, higher in income and occupation status and higher in socioeconomic status (Chan, 1999; Diamantopoulos et al., 2003; Roberts, 1996).

The third segmentation framework distinguishes consumers based on their cognitions, and especially their knowledge and attitudes about products (Darnall et al., 2012, 2016; do Paço et al., 2009; Thompson et al., 2010; Verain et al., 2012). Within this framework studies suggest that consumers who have a better understanding of and a stronger positive emotional state towards environmental and health-related concerns are more likely to purchase labeled products (Darnall et al., 2016). Other studies distinguish consumers based on their personal values (Biswas and Roy, 2015; Verain et al., 2012). They identify consumers' openness to change, self-transcendence, conservation and self-enhancement as factors associated with consumers' purchase of sustainability and health-related products (Verain et al., 2012).

The fourth segmentation framework distinguishes consumers based on their lifestyles in terms of how consumers spend their money and time and their personal interests (Anderson and Golden, 1984; Rieger et al., 2017). These studies assess consumers' sustainability and health-related behaviors such as recycling and other environmental protection actions (Fraj and Martinez, 2006). Consumers identified as having strong environmental lifestyles (also referred to as LOHAS consumers) tend to be active environmental stewards who make personal and planetary health a priority (NMI, 2008). They also tend to be first movers in purchasing new sustainability and health-related product labels (NMI, 2008).

Across these segmentation frameworks, there are two important shortcomings. First, most of the research that underpins these frameworks is based on consumers' self-reported purchasing

behavior (by way of surveys and interviews) and, thus, are subject to an attitude-behavior gap (Davies et al., 2002; Peattie, 2001) in addition to social desirability bias (Fisher, 1993; Schwarz, 1999). Second, existing segmentation frameworks do not differentiate consumers based on the benefits labels offer to consumers. The following sections describe how both factors have important implications for our understanding of sustainability and health-related labels and the consumers who purchase them.

2.3. Self-reporting and consumer segmentation

The most robust segmentation frameworks of consumers' sustainability and health-related expenditures should rely on consumers' actual purchasing data (Chan and Lau, 2000; Matthes et al., 2014; Moser, 2015; Thompson et al., 2010). However, researchers seeking to obtain these sorts of data confront several formidable challenges. First purchasing data is typically considered proprietary to retail businesses. Gaining access to them, therefore requires significant negotiation and confidentiality assurances, if access is granted at all. Second, obtaining data on consumers' purchases raises ethical concerns about individuals needing to consent (Norberg et al., 2007; Norberg and Horne, 2007; White, 2004) regarding the nature of purchase data that is collected and how the data will be assessed. Since purchase data are usually assembled long after consumers' point of purchase, it is generally not possible to obtain consent.

To avoid these concerns, most consumer segmentation frameworks (see Verain et al., 2012 review) are constructed using survey data of consumers' self-reports of their behaviors and attitudes (e.g., Deliza et al., 1999; Kihlberg and Risvik, 2007; Janssen et al., 2009). In justifying their reliance on consumers' self-reported behaviors and attitudes, researchers suggest that individuals' behaviors are predicted by their intentions, which are a function of the attitudes towards the behavior and subjective norms (or perceived social pressure) (Ajzen and Fishbein, 1977; Ajzen, 1985). According to Ajzen (1991) intentions are able to predict the motivations that influence the adoption of specific behavior such that the stronger the intention to engage in a behavior, the more likely is behavior adoption (Ajzen, 1991).

However, recent empirical evidence suggests a discrepancy between stated and actual behaviors, due to a variety of contextual factors that include insufficient or incorrect information, price, lack of awareness and credibility, availability, and time restrictions (e.g., Castro, 2015; Chekima et al., 2017; Fischer et al., 2017). This discrepancy has increased concern about a deviation between consumers' reported attitude and their actual purchasing behavior, known as an "attitude-behavior gap" (Davies et al., 2002; Peattie, 2001). For instance, one-third of UK consumers claim that they are very concerned about environmental issues. Yet this concern is not reflected in consumers' purchases (Young et al., 2010). Similarly, consumers' self-reported recycling behaviors are over-reported compared to observed behavior (Gamba and Oskamp, 1994), and self-reported "green" public procurement tenders are greater than actual "green" purchases (Testa et al., 2016).

Another problem with self-reporting is that it is affected by a social desirability bias among respondents (Félonneau and Becker, 2008). Social desirability bias occurs when consumers over-report their more socially acceptable purchasing behaviors (Auger and Devinney, 2007; Magnusson et al., 2001; Vermeir and Verbeke, 2006). In consumer studies this bias arises from prevailing social norms towards environmental and social issues. Individuals seek social approval and wish to characterize themselves in a favorable light (Félonneau and Becker, 2008). Consumers thus distort information about their actual behaviors (Phillips and Clancy, 1972). Such distortions can have serious implications for the validity and

reliability of sustainability and health-related research that is based on self-reports.

Finally, consumers' self-reports are affected by features of the research instrument, such as question wording, format, context effects, behavioral frequency reports and question comprehension (Schwarz, 1999). Interaction with interviewers and anonymity assurances (or the absence thereof) also influences consumers' self-reports (Holtgraves, 2004). In the context of consumers' sustainability and health-related purchases, these research instrument issues tend to cause consumers to over-report their purchases of labeled products (Moser, 2015).

In sum, each of these problems point to the fact that existing consumer segmentation frameworks are likely to over-represent the prevalence of sustainability and health-related purchasing. All these concerns have led to calls for research that examines actual consumer behavior (Chan and Lau, 2000; Matthes et al., 2014; Moser, 2015; Thompson et al., 2010).

While studies based on revealed preferences exist, they address other research gaps. Andersen (2011) estimates consumers' willingness to pay for organics eggs. Rieger et al. (2017) investigate variations in household demand for poultry following a food scandal. While the study is based on the combination of stated and revealed preferences, the consumer segmentation framework they develop is based on self-reported data. Vermeir and Verbeke (2006) examine the gap between consumers' positive personal attitudes towards sustainable dairy products and their intentions to purchase them, but does not use actual purchasing data. Schröck (2012) estimates the price-elasticity demand for organic milk market in Germany and segments consumers into three types of purchasers – nonbuyers, occasional buyers and committed buyers. This study differs from ours because it only considers consumer purchases for a single label. As a consequence, it cannot contrast the benefits of different types of labels and how consumers respond to those benefits. Finally, Buder et al. (2014) propose a consumer segmentation framework based on consumers' stated preferences rather than actual purchases. To the best of our knowledge, no existing studies develop a consumer segmentation framework based on actual purchasing expenditures for sustainability and health-related labels. Additionally, no studies assess how consumers respond to different types of sustainability and health-related labels based on the benefits they convey.

3. A new consumer segmentation framework based on product benefits

Beyond the biases associated with consumers' self-reports, a second general limitation of existing research relates to the lack of differentiation regarding the benefits labels may offer and how variations among these benefits may influence consumer purchasing decisions. That is, some products bearing sustainability and health-related labels promise more public benefits, whereas others offer more private benefits or both types of benefits. When purchasing sustainability and health-related products, different types of benefits – public benefits vs. private benefits vs. both – are associated with different segments of consumers.

Public benefits are generally more collectivist in nature and are non-excludable (Prakash, 2002). These benefits are bestowed to society as a whole and tend to be associated with the inclusion of others and the need for harmony and unity. They involve emotions such as empathy and indebtedness (Aaker and Williams, 1998). Because of their focus on society rather than the individual, public benefits are often considered altruistic (Kareklas et al., 2014; Magnusson et al., 2003). Examples of public benefits include improved environmental outcomes, enhanced animal welfare (Andersen, 2011; Bellows et al., 2008; Onyango et al., 2007), and

improved economic outcomes in developing countries through fair trade (Bird and Hughes, 1997; Gould, 2003).

By contrast, private benefits focus on consumers' individualistic concerns (Kareklas et al., 2014; Lau-Gesk, 2003; Zhang and Gelb, 1996). These benefits tend to be egoistic (Kareklas et al., 2014) and generally exclude others (Prakash, 2002) by creating more value to the individual purchaser than to society as a whole (Aaker and Williams, 1998). Examples include products that offer user value such as personal and/or family health benefits such as improved wellbeing, convenience, taste, freshness, and cost-savings (Bellows et al., 2008; Onyango et al., 2007).

By considering the benefits that labels offer – either public or private or both – our study develops a consumer segmentation framework that is related with consumers' actual purchasing decisions, as illustrated in Fig. 1. Some types of consumers are likely to purchase products with labels that only promise public benefits. Our work refers to these consumers as “altruists”. Other consumers may be likely to purchase products with labels that convey only private benefits. These consumers have been called “individualists”. Still other consumers may be more likely to purchase products with labels that offer both types of benefits. These consumers are “collectivists”. Finally, some consumers may not purchase products with any label, regardless of the benefits they convey. These consumers have been named “indifferents”. As yet, the benefits – public or private – that motivate consumers to purchase labeled products has not been assessed.

This research contributes to two important debates: 1) bias associated with consumer self-reports (Chan and Lau, 2000; Matthes et al., 2014; Moser, 2015; Thompson et al., 2010), and 2) that existing consumer segmentation frameworks do not consider the benefits that products promise (Haley, 1995). It addresses the question of whether there are different segments of consumers exist when considering actual purchases of products bearing sustainability and health-related labels. It does so by first developing a consumer segmentation framework based on consumers' actual purchases of sustainability and health-related products. It then differentiates these products based on whether the labels offer public benefits, private benefits, or both.

4. Methodology

4.1. Data description

Shopping expenditures were collected from a sample of 132 Italian consumers that was monitored over 30 months spanning January 2014 to June 2016. Expenditure data were collected at stores owned by UniCoop Tirreno, a supermarket owned by Coop Italia Group. Coop Italia Group is a system of supermarkets that comprises the largest supermarket chain in Italy. The product range of Unicoop Tirreno includes a wide variety of foods (e.g., fresh produce, frozen food, and processed food) and non-food items such as paper products, detergents, and personal care products.

The sample was selected from a group of consumers who are members of UniCoop Tirreno's voluntary loyalty card programme.

		Consumers Motivated by Public Benefits	
		Yes	No
Consumers Motivated by Private Benefits	Yes	Collectivists	Individualists
	No	Altruists	Indifferents

Fig. 1. Benefits-focused consumer segmentation framework.

UniCoop Tirreno members were offered additional loyalty points to encourage them to participate in the study. Participants accounted for a total of 372,239 purchases over 30 months. These data were combined with UniCoop Tirreno's data for the company's entire stock of 630,971 purchasable items.

The sample is representative of Italian consumers (18 years and older) based on gender ($p < 0.001$), mean age ($p < 0.001$) and education related to university and post-graduate degree ($p < 0.001$), as shown in Table 1. However, our sample tends to over-represent consumers who are better educated and mostly employed. While these distinctions constrain the generalizability of our findings slightly, ecolabel purchasers tend to have higher incomes and are employed (Chan, 1999) and so the sample includes more consumers who are likely to be influenced by ecolabels (Chan, 1999; Darnall et al., 2017).

4.2. Measures of sustainability and health-related purchasing behavior

To measure consumers' purchasing behavior, five categories of sustainability and health-related product labels have been identified, that had been in use for at least 15 years and were well-recognized in the Italian (and European) market. They varied based on the levels of public and private benefits they offer. Label categories that focused on non-food items consisted of ecological labels. Food-focused labels included social equity labels, health labels, organic labels and vegan labels. Across these five types of labels, ecological and social equity labels tend to offer public benefits (see Fig. 2). Health labels tend to offer private benefits and organic and vegan labels offer both benefits. Each of these labels and the benefits they convey are described further below.

Ecological labeled non-food products that are labeled with either the Forest Stewardship Council (FSC) or the European Ecolabel (also known as the EU Flower). These labels promote environmental stewardship more generally and therefore offer a greater degree of public benefits than private benefits. Since 1997, the FSC label has identified products for their commitment to the environment and responsible forest management, and helps the consumer to make socially and environmentally responsible buying decisions (FSC, 2015). FSC labeled products include common paper products such as paper towels or printing paper. Because of the label's broader focus on society and the environment, it offers a greater degree of public benefits.

Similarly, established in 1992, the EU Ecolabel is a European certification that identifies products and services that have a reduced environmental impact (European Commission, 2010). This label focuses specifically on identifying products with lower life-cycle impacts from the extraction of raw material through to production, use and disposal (European Commission, 2010). EU Ecolabel certified products include, for instance, detergents or personal care products.

Table 1
Comparison of demographic characteristics – sample and population.

Demographics	Description	Sample	Population*
Gender**	Male	44.33%	47.98%
	Female	55.67%	52.02%
Age**	Mean	44.33%	47.98%
Education	Middle school certificate or less	15.46%	50.83%
	High school diploma	62.89%	35.72%
	University degree and post-graduate degree**	21.64%	13.45%
Job status	Employment rate	81.44%	43.82%

* Population consists of individuals 18 years and older drawn from 2016 ISTAT data.

** Statistically insignificant difference ($p < 0.001$) between sample and population.

		Label Promises <u>Public</u> Benefits	
		Yes	No
Label Promises <u>Private</u> Benefits	Yes	Organic (n= 15,445) Vegan (n=1,741)	Health (n=7,640)
	No	Ecological (n=10,179) Social Equity (n=1,256)	No Label (n=335,978)

Fig. 2. Mapping sustainability and health-related labels. Into the benefits-focused consumer segmentation framework*.

* Number in parentheses represents the number of consumer purchases in our sample for each label category.

Within our sample, consumers had 10,179 transactions involving the purchase of ecological products.

Social equity labeled food products promote greater equity in international trading partnerships and support producers in developing countries to achieve better trading conditions. Since 2002, the International Fairtrade Certification Mark has emphasized equality in the marketplace by ensuring that farmers and workers are paid a fair wage and have greater economic security. The label offers no explicit reference to taste or health. However, it is possible that consumers may still perceive fair-trade products to be healthier, tastier and of better quality than traditional ones (de Ferran and Grunert, 2007; De Pelsmacker et al., 2006). Coffee, cocoa, tea and infusions are the most common categories of fair trade certified products. Additionally, the label promotes socially responsible practices. As a consequence, the label promises consumers that their purchase will yield more public benefits than private benefits. Although other social equity labels exist, including Rainforest Alliance or UTZ, they are not well known in Italy and no products with other labels existed in our database. Consumers had 1256 transactions involving the purchase of fair trade social equity labeled products.

Health labeled food products are a group of self-declared food labels that are marketed for improving wellbeing. They include labels indicating that a product excludes one or more ingredients that are related to consumer allergies or intolerances. These “free from” labels include products indicating that they are free from ingredients such as lactose, salt, sugar, yeast or glutamate (European Commission, 2011). They also include labels indicating that products offer an additional function related to health promotion or disease prevention, which is attained by adding new ingredients to the food product or by adding more of the existing ingredients. These labels go beyond traditional nutritional claims, and include statements related to a product's probiotic, prebiotic, high fiber or high calcium attributes (Stein and Rodríguez-Cerezo, 2008). Health labeled products focus on the individual consumer and the benefits that are conveyed to them, such as personal aesthetic, health, medical advice and parental care (Sparke and

Menrad, 2009; Wansink, 2005). For these reasons they offer more private benefits than public benefits. Within our sample, consumers had 7640 transactions involving the purchase of health labeled products.

Organic labeled food must comply with specific standards of organic farming. Since 1991, the EU has promoted these comprehensive standards which apply to food production, processing, distribution, labeling and controls that apply to produce, grains, dairy, meat, poultry, eggs, honey, and other food items. The EU organic food label guarantees environmental protection and animal welfare by establishing rules about production, banning genetically modified organisms and limiting the use of chemical pesticides and fertilizers (European Commission, 2007). For this reason, the label offers consumers public benefits. However, by ensuring food quality and limiting the use of antibiotics, food additives and processing aids (European Commission, 2007), the label also promises consumers who purchase organic food certain private benefits as well. Within our sample, consumers had 15,445 transactions involving the purchase of EU organic labeled food.

Vegan labeled food bears the Vegan Trademark, which is an internationally recognized standard for vegan products. Established in 1990, the label identifies products (e.g., processed foods, such as seitan, tofu, and plant-based cheeses and milk), that do not contain animal products, by-products or derivatives. These products also do not involve testing on animals, the use of animal genes, or animal-derived substances for the production of genetically modified organisms (Greenebaum, 2012; Janssen et al., 2016). The vegan label therefore conveys assurances about maintaining animal welfare and animal rights (Janssen et al., 2016) and offers public benefits (Lindeman and Sirelius, 2001; Hoek et al., 2004). Additionally, vegan food offers private benefits because it is often cheaper than animal-based foods and tends to be low in saturated fat and high in fiber, which can benefit personal health (Beardsworth and Keil, 1991; Craig, 2009; Janssen et al., 2016). Within our sample, consumers had 1741 transactions involving the purchase of vegan labeled products.

After identifying these five categories of sustainability and health-related product labels, an indicator that accounted for consumers' proportion of purchasing the five categories of sustainability and health-related labeled products over time has been generated. This proportion was measured as a ratio of shopping expenditures for each individual (*i*), expressed as the total expenditure for each product category (1,2,3,4,5) over the total expenditures.

$$\text{Purchasing ratio} = \frac{\text{total expenditure}_i \text{ for product category } x_{1...5}}{\text{total expenditures}_i}$$

Consumers' purchasing ratio is an appropriate measure to use because price negatively affects consumers' sustainable purchasing behavior (Biswas and Roy, 2015; Li et al., 2016; Testa et al., 2015). Since price is a significant barrier in consumers' purchasing, this purchasing ratio is a more reliable measure than using units sold, which can greatly skew the results. For instance, the purchase of one organic item that sells for 0,50€ is not comparable with the purchase of another organic item, which sells for 8€. Additionally, price allows for comparisons with consumers' total expenditures, which includes purchases of traditional products.

4.3. Statistical methods

To assess how consumers respond to sustainability and health-related product labels, a cluster analysis has been performed, using consumers' purchasing ratios for their purchases of ecological products, social equity products, health products, organic products,

and vegan products. Cluster analysis is widely applied in consumer studies (do Paço et al., 2009; Gilg et al., 2005; NMI, 2008; Vassilikopoulou et al., 2005) because it effectively classifies individuals into similar groups. This analytical approach is particularly useful to our setting as our study is assessing consumer behaviors by identifying homogeneous groups of buyers (Punj and Stewart, 1983). Each group is mutually exclusive, has the maximum differentiation between consumer groups, and has the maximum homogeneity within each consumer group (Hair et al., 1998).

Cluster analysis is preferred over other techniques, such as linear regression or structural equation modeling, since our study aims at developing a classification rather than constructing a predictive model (Cerri et al., 2018; Ha and Janda, 2012). A non-hierarchical clustering method (k-means) for grouping observations has been used. K-means clustering partitions observations into clusters such that each observation belongs to the cluster with the nearest mean. K-means clustering allows the user to specify the number of clusters, and is especially useful when grouping cases that have similar characteristics (Hair et al., 1998).

As a robustness check of the three cluster solution, our clustering procedure has been assessed by setting the number of clusters to two, four and five clusters. Suggested by Dolnicar and Leisch (2010), this procedure examines the similarity of clusters solutions for *k* clusters (*k* = 2, ... 5), when applying k-means to 100 bootstrap samples. The test confirmed the reliability of the three cluster solution as being the most stable outcome (Rand Index = 1). Moreover, the significance of our results has been assessed by using a multivariate analysis of variance (MANOVA) test that compared the multivariate sample means (Stevens, 2012; Warne, 2014).

5. Results

The results show that 132 consumers are segmented into three clusters with differing purchasing ratios (see Table 2). These consumer clusters have been referred as collectivists, individualists and indifferent. In considering how the clusters differ statistically, our MANOVA results show significant differences (*p* < 0.001) among all categories of consumers, thus offering additional evidence for our findings.

The first cluster of consumers (collectivists) accounts for 7 percent of the sample, as shown in column 2 of Table 2. The second cluster of consumers (individualists) represents 22 percent of the sample. The third cluster of consumers (indifferents) represents the majority (71%) of individuals in our sample.

Collectivists are characterized by the highest proportion of their total purchases being allocated towards sustainability and health-related labeled products. Indeed, 27.54 percent (see Table 2, column 9) of their total purchases over 30 months were for items bearing one of the sustainability and health-related labels. This compares to individualists who allocated 10.44 percent of their total purchases towards products bearing one of the sustainability and health-related labeled products. Indifferents allocated only 3.60 percent of their total purchases towards labeled products.

Related to labels that offer public benefits, 2.15 percent of collectivists' total purchases were for products bearing an ecological label and 1.8 percent were for social equity labeled products. Individualists allocated 1.62 percent of their total purchases towards ecological labeled products and .31 percent towards social equity labeled products. Indifferents allocated 0.97 percent of their total purchases towards ecological labeled products and .22 percent of purchases towards products bearing a social equity label.

Collectivists were characterized by the highest level of purchasing across labels offering private benefits. On average, 4.15 percent of collectivists' total purchases were for products bearing a health label, compared to 3.03 percent for individualists and 1.05

Table 2
Cluster analysis results –consumer segments based on label purchases*.

Consumer Segment	Percent Of Sample	Statistic	Label Benefits and Category					Mean Percent of Total Purchases	
			Public Benefits		Private Benefits	Public and Private Benefits			
			Social Equity	Ecological	Health	Organic	Vegan		
			<i>Collectivists</i>	7%	Mean % of total purchases	1.80	2.15	4.15	17.66
		N	9	9	9	9	9		
		Std. dev.	1.56	1.83	4.36	10.06	3.31		
<i>Individualists</i>	22%	Mean % of total purchases	0.31	1.62	3.03	4.47	1.01	10.44%	
		N	29	29	29	29	29		
		Std. dev.	0.25	1.22	2.72	1.45	1.48		
<i>Indifferents</i>	71%	Mean % of total purchases	0.22	0.97	1.05	1.25	0.11	3.60%	
		N	94	94	94	94	94		
		Std. dev.	.47	.80	1.14	.93	.18		

* MANOVA statistics (W, P, L, R) for all comparisons are significant at $p < 0.001$.

percent for indifferents.

Finally, collectivists purchased higher levels labeled products that offered both public and private benefits in that 17.66 percent of their total purchases were for organic labeled products and 1.78 percent were for vegan labeled products. This compares to individualists, who allocated an average of 4.47 percent of their total purchasing towards organic labeled products and 1.01 percent towards vegan labeled products. Indifferents allocated only 1.25 percent of their total purchasing towards organic products and 0.11 percent towards vegan products.

Further assessment of our purchasing data showed that a limited number of products had both fair trade and organic labels. More specifically, 27 products (purchased 631 times) had double certifications. These products accounted for 0.2 percent of the total amount of consumers' total purchases (372,293), 4 percent of the total organic transactions (15,445) and 50 percent of the total fair trade transactions (1,256). Given the large proportion of fair trade purchases with double certification, several alternative model specifications have been run to test the robustness of our findings. First, cluster analysis has been conducted by double-counting these labels, so that they were included in both the organic and fair trade categories. Second, products with dual labels have been removed and the analysis has rerun. Third, the same cluster analysis has been performed by including dual labeled products in the fair trade label category and then separately in the organic label category. Across all specifications, no changes appeared in our cluster analysis results.

When applying robustness checks of the three cluster solution, and setting the number of clusters to two, four or five clusters, it has been found out that the three cluster solution is the most stable model and has a Rand Index of 1. Moreover, across all clustering approaches, collectivists emerge as consumers who purchase proportionally larger numbers of products offering both public and private benefits. Additionally, across all clustering approaches, individualists purchase proportionally larger numbers of labeled products that offer private benefits. Indifferents purchase far fewer of all types of labeled products. These findings are robust across all

clustering procedures.

Since consumers' socio-demographics can play a role in sustainability and health-related purchases, the three consumer clusters have been correlated with consumers' demographic characteristics (see Table 3). Across all three consumer segments, the results show that no significant correlation among the clusters and consumers' gender, age, and job status. Related to consumers' level of education, collectivists (0.24, $p < 0.01$), indifferents (0.21, $p < 0.05$), and individualists (-0.33 ; $p < 0.001$) are associated with consumers' level of education. However, while the correlations are significant, they are weak in that they are below 0.40 (Evans, 1996). These findings support recent empirical research (e.g., Cerri et al., 2018) focusing on Italian context that suggests that socio-demographic factors appear less important to characterizing consumers' sustainability and health-related purchases.

6. Discussion

Across the globe, the number of sustainability and health-related labels has expanded significantly. However, as yet, little is known about the extent to which these labels influence different segments of consumers' actual purchases. This research attempts to address this gap and offers three important contributions to the literature.

First, this study responds to researchers' calls for product label research that relies on consumers' actual purchasing data (Chan and Lau, 2000; Matthes et al., 2014; Moser, 2015; Thompson et al., 2010). It significantly extends prior studies by evaluating 132 consumers' actual purchases of sustainability and health-related labeled products across more than 370,000 transactions.

In comparing our typology to prior research, the consumer segmentation framework that is most closely related is the fourth framework, which distinguishes consumers based on their lifestyles (Anderson and Golden, 1984) and the extent to which consumers make personal and environmental stewardship a priority (Anderson and Golden, 1984; Fraj and Martinez, 2006). Using self-reported data, NMI (2010) consumer lifestyle study estimates that 16 percent of Italian consumers make personal and environmental stewardship a priority, 76 percent are engaged in sustainability in some way, and 9 percent are not concerned about personal and environmental stewardship (NMI, 2010). In a similar study of Italian consumers using self-reported data, it has been estimated that 12 percent of Italian consumers actively purchase sustainability oriented products, 51 percent of consumers show inconsistent behavior, and 37 percent are not concerned about sustainability issues (Angelini et al., 2012), as shown in Table 4.

The results of this study offer more conservative findings, most

Table 3
Correlations between consumer segments and demographic characteristics.

	Collectivists	Individualists	Indifferents
Gender	0.00	0.07	-0.10
Age	-0.16	0.11	-0.02
Job Status	0.02	-0.10	0.15
Education Level	0.24**	-0.33***	0.22*

*, **, *** Statistically significant at $p < 0.05$; $p < 0.01$, $p < 0.001$, respectively.

Table 4

Comparison of benefits-focused consumer segmentation framework results and lifestyle consumer segmentation framework studies*.

Benefits-focused Consumer Segmentation Framework – (Based on Consumers' Actual Purchases)		Lifestyle Consumer Segmentation Framework Studies – (Based on Consumers' Self-reported Purchases)			
Current Study	Percent	NMI (2008) Study	Percent	Angelini et al. (2012) Study	Percent
Collectivists	7%	Italian consumers make personal, environmental stewardship a priority	16%	Italian consumers identified as being active consumers of sustainability oriented products	12%
Individualists	22%	Engaged in personal, environmental stewardship in some way	76%	Show inconsistent sustainability behaviors	51%
Indifferents	71%	Not concerned about personal, environmental stewardship	9%	Not concerned about sustainability	37%

* All three studies are for Italian consumers.

likely because of consumers' discrepancies between stated and actual behaviors (Castro, 2015) and an “attitude-behavior gap” (Davies et al., 2002; Peattie, 2001). These issues are significant concerns identified by earlier scholars (Chekima et al., 2017; Fischer et al., 2017; Testa et al., 2016; Young et al., 2010). The more conservative results may also be due to respondents' social desirability bias where individuals seek social approval and wish to characterize themselves in a favorable light (Félonneau and Becker, 2008) by distorting information about their actual behaviors (Phillips and Clancy, 1972). Self-reported sustainability behaviors thus tend to over-estimate actual behavior (Auger and Devinney, 2007; Moser, 2015; Pearson et al., 2011; Peattie, 2010). Our findings avoid these concerns and, thus, are likely to offer more reliable estimates of the market segmentation for sustainability and health-related labels in Italy, at least among more educated and employed individuals who are more likely to purchase ecolabeled products (Chan, 1999; Diamantopoulos et al., 2003; Roberts, 1996).

The second contribution of this research is that it offers a consumer segmentation framework that focuses on the benefits that sustainability and health-related labels promise. It finds evidence of three types of consumers – collectivists, individualists and indifferents, (Diamantopoulos et al., 2003; Roberts, 1995; Thompson et al., 2010), More than any other segment, collectivist consumers purchase more labeled products that offer public benefits, such as reduced impacts to the environment and improved social equity conditions. Additionally, collectivists, more than any other consumer segment, purchase more labeled products that convey private benefits, such as improved health. These consumers (7 percent) represent an emerging niche market who allocate a significant portion (27.54 percent) of purchases towards sustainability and health-related labeled products.

Individualist consumers (our second cluster) represent 22 percent of the sample. They allocate 10 percent of their total purchases towards products with sustainability and health-related labels. This market segment is influenced less by public concerns, such as social equity, and more by the private benefits bestowed by sustainability and health-related labels. Indifferent consumers represent the majority (71 percent) of our sample. Contrary to our expectations, indifferents still purchase products with sustainability and health-related labels (3.6 percent of their total purchases); they simply purchase far fewer of them.

With only 7 percent of the consumer market being attentive to sustainability and health-related labels, it would be easy to infer that product labels are ineffective at influencing the consumer market. One rationale for the low impact may be label ambiguity, insufficient label information, and ineffectiveness at assuring whether the label's public or private benefits are met (Galarraga

Gallastegui, 2002; Van Amstel et al., 2008). The business response may thus be to temper the development of labeled products. However, the combined purchasing power of collectivists and individualists, accounts for 29 percent of the total market. This proportion is noteworthy, and represents a significant opportunity to firms that can offer products that appeal to these consumers.

Indifferents represent 71 percent of consumers in the sample. They purchase far fewer products with sustainability and health-related labels. One possibility for indifferents' low of interest in sustainability and health-related labels may be a lack of awareness. If so, the findings validate concerns expressed by other scholars about the need to increase consumer awareness and confidence in labels by providing information and by limiting noise in the market (Darnall and Aragon-Correa, 2014; Darnall et al., 2017; Testa et al., 2015; Wei et al., 2017).

No evidence of a fourth category of consumers – altruists – who focus their label purchases on products that offer public benefits only has emerged. Rather, it appears that consumers who purchase labeled products that offer public benefits also tend to purchase labeled products that offer private benefits. These findings are important because many previous studies have explored the altruistic component of green consumption focusing on environmental concern (Pagialis and Krontalis, 2014), awareness about the consequence of a specific consumption behavior (Grunert et al., 2014), a sense of moral obligation (Moser, 2015) to intervene. While altruism appears to have a role with our sample, altruism does not exist on its own in explaining consumers' purchases of sustainability and health-related products. Rather, consumers appear motivated to purchase labeled products that offer public benefits in addition to labeled products that offer private benefits, and products that offer both. Indeed, labeled products offering both benefits were the most purchased sustainability and health-related labels in our study.

A third contribution of this study is that it offers tangible evidence about the crucial role of information in understanding consumer's purchasing behavior (Taufique et al., 2017). Increasingly, consumers are seeking information about the products that they intend to buy (De Pelsmacker and Janssens, 2007). They are requesting information about a product's production process (Janssen et al., 2009), origin (Feldmann and Hamm, 2015) and environmental impact (Bellows et al., 2008). Accordingly, consumers appear to be noticing the information contained in product labels and associating them with personal motives and the product's features (Atkinson and Rosenthal, 2014). By focusing on actual purchasing behavior, the results of our research offer additional evidence about the importance of sustainability and health-related information to consumers and the importance of product labels in general.

7. Conclusions

In sum, using consumers' actual purchasing data, this research suggests that when eliminating self-report bias there are distinct segments of consumers that purchase sustainability and health-related labels. It finds that these consumer segments are influenced differently depending on whether a product label promises either public benefits, private benefits or both. These findings are relevant to researchers who assess consumers' sustainability and health-related purchasing, as well as firms that seek to brand their products for their sustainability and health-related attributes.

Future research would benefit from studying consumer purchases across a larger sample of individuals. Such an investigation might identify important nuances among our broader consumer segments, such as latent subgroups that our assessment could not detect. While obtaining a larger sample would pose difficulties, since it would likely require significant negotiation with retail businesses, in addition to consumer confidentiality assurances, the results of our research offer some justification to pursue a larger sample. Additionally, it would be interesting for future research to consider whether product labels are effective at conveying information about the benefits they offer to consumers and whether consumers have perceptions about labeled products that differ from the actual characteristics of the product label. Moreover, prospective research should explore whether consumers' expenditures change over time and how issues such as brand loyalty, path dependencies and press influence temporal purchasing decisions.

Future research might also investigate the factors that might tip indifferent consumers towards individualist or collectivist purchasing over time. Understanding this issue would be relevant to researchers assessing sustainability and health-related labels, but also to businesses that seek to market their sustainability and health-related products. Knowing more about what factors tip consumers from an indifferent position to an individualist or a collectivist purchasing position would also offer important information to label sponsors who are seeking to encourage broader consumer interest in their labels.

Finally, prospective research would benefit from considering how variations in label information influences consumers' purchasing decisions. Prior research suggests that consumers are more likely to purchase sustainability labels that are sponsored by environmental nonprofits over government entities or industry associations. This may be due to the fact that labels developed by environmental nonprofits are designed with stronger rule standards that help achieve their environmental and social objectives. However, future research would benefit from considering these issues further.

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