Sustainable Development and the Consumer: Exploring the role of Carbon Labelling in Retail Supply Chains

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ABSTRACT

This empirical article contributes to the sustainable development debate by examining consumer responses to carbon labels within a real world context. Given the limitations of methodologies that use self-reported or intended measures of purchasing behaviour, we use the loyalty card data of the largest supermarket retailer in the UK to measure the impact of carbon labels on sales by different consumer segments. The data show that the trial of carbon labels on supermarket own brand products have had no discernible impact on shifting demand to lower carbon products. In order to explore possible reasons behind this lack of impact, nine focus groups were carried out using purposive sampling by retailer consumer segments to allow an exploration of awareness, understanding and use of carbon labels. The findings from the focus groups identified possible reasons behind this lack of impact: lack of awareness and understanding of carbon labelling; constraining or facilitating social and cultural influences, and the heterogeneous nature of consumers. As a result, a number of implications for stakeholders are discussed.

Introduction

The relationship between current human behaviour and the sustainability of our planet for future generations is a hotly contested topic. Global threats caused by human behaviour to public health, the environment, agriculture, equity and the economy (Kim and Neff 2009) are of great concern to governments, industry and consumers (IPCC 2007; Stern 2007). In particular, the major source of such threats has been identified as the unsustainable pattern of consumption and production in industrialised countries (UNEP, 2001). As a response, there have been calls for changes to human consumption behaviour in order to reduce atmospheric greenhouse gas concentrations considered to impact on changing climate patterns (Bagozzi 2000; Mick 2006, 2008; Goldstein et al. 2008). Over time, external and internal factors have led organisations to consider a range of strategic responses to the issue of climate change, not just at the firm level, but including upstream supply chains and down stream customers (Walker and Jones, 2012, Lee 2012, Gimenez and Tachizawa 2012, Sprengel and Busch 2011, Pinkse and Kolk 2010). Perceived demand is a key driver, with the general assumption that consumers can contribute to these efforts by making 'sustainable' consumer choices, provided they have the information to inform such choices.

The social and environmental impact of a product cannot be evaluated by consumers before purchase, or experienced post purchase, and labelling is frequently used as a means to overcome information asymmetry throughout the supply chain (Thompson et al. 2010, van Amstel et al. 2008, Sammer and Wüstenhagen 2006). Eco labelling attempts to communicate information to consumers regarding the environmental externalities of global production, with the

assumption that concerned consumers can make comparisons, and give preference to products or services that have less environmental impact (Schepers 2010; Smith et al. 2010; Gertz 2004).

Carbon labels (or 'carbon reduction labels') are the end result of a complex and controversial process designed to increase transparency regarding emissions, and involves carbon measurement, footprinting and labelling of a particular product along the supply chain (Brenton et al, 2009). Carbon labelling is in its infancy, and has to date been confined to trials and pilot projects involving the auditing and labelling of limited ranges of consumer products (Hartlieb et al. 2009). France, Germany, Japan and Korea are examples of countries engaging trial schemes on limited product ranges, whilst Tesco, the UK's largest retailer, has trialled carbon labelling on a limited number of own brand grocery products (McKinnon 2010) as part of their sustainability strategy, the objective of which is to reduce overall carbon emissions along the supply chain. Early research exploring consumers' understanding, attitudes and intentions towards the theoretical concept of carbon labelling has been mixed (Wheatland 2007; Gadema and Oglethorpe 2011).

Therefore, one of the major unknowns in the current debate about the effectiveness of carbon labelling is the behavioural response, and the extent to which demand has shifted to lower carbon products (McKinnon 2010; Thøgersen et al. 2010). Previous research into sustainable purchasing behaviour has been criticised for an over reliance on self-reported or intended behaviour measures (Schwepker and Cornwell 1991; Shrum et al. 1995; Robinson and Smith 2002; Selfa et al. 2008; Vermeir and Verbeke 2008) rather than using actual behaviour data. Such methods are inherently

inaccurate due to flawed recall and social desirability bias (Burgess et al. 2003; Carrington et al. 2010).

Given this research gap, our study aims to examine consumer responses to carbon labels within the real world context (Andorfer and Liebe, 2012). In the UK, food retailers are identified as being at a mature stage in responding to sustainability issues (Isles, 2007), with consumers being identified as particularly influential drivers of corporate responses to climate change (Heikkurinen and Forsman-Hugg, 2011, Sprengel and Busch 2011). However, empirical research examining sustainability initiatives by food retailers and insight into consumer behaviour with regard to sustainable purchasing behaviour is lacking (Chkanikova and Mont, 2012, Pinkse and Kolk 2010). Even more importantly, there is a need to examine the impact of sustainability initiatives by food retailers (Hampl and Loock 2013). The trial of own brand carbon labelled products by Tesco, the third largest supermarket in the world, and the largest supermarket in the UK, offers a unique opportunity to empirically investigate the impact of carbon labels within product categories, using customer loyalty card data to track actual purchasing behaviour. In order to explore the role of carbon labelling further, a series of focus groups were held to gain an appreciation of current levels of awareness, understanding and use of carbon labelling within the context of the Tesco trial.

The article begins by exploring the literature on sustainable consumption. We discuss eco labelling in general, and then describe the current situation regarding carbon labelling. We then explain and justify our methodological approach, and

present the findings of our exploratory research. Finally, we discuss the implications of the findings and identify further avenues of research.

Sustainable Consumption

Seyfang (2005) discusses the contested nature of the term "*sustainable consumption*", and notes that over time, governments have adopted the dominant model of market failure as the prime cause of unsustainability. As a result of this perspective on sustainable consumption, governments have focused on changing consumption patterns rather than reducing consumption volumes, through market based measures such as taxes, tariffs, public sector purchasing policies, education and social marketing campaigns, and voluntary eco-labelling schemes. The objective is to influence producers to be more eco efficient and offer consumers more choice in terms of 'green' products (Seyfang, 2005). In response to external and internal stakeholder pressures, firm strategies in relation to climate change issues (Lee 2012, Sprengel and Busch 2011), differ dependent on drivers and barriers (Chkanikova and Mont 2012). This may include extending the level of responsibility for sustainable performance beyond the reach of firm ownership and direct control, to upstream supply chain and network partners (Gimenez and Tachizawa 2012, Walker and Jones 2012). Market structure is a key determinant, and in the concentrated UK food retail industry, 'own brands' are an important component of business strategy. As production is outsourced to key suppliers, management of the supply chain is critical.

For our purposes, we adopt the definition of sustainable consumption as "the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste

and pollutants over the life cycle, so as not to jeopardise the needs of future generations" agreed at the Oslo Symposium of 1994 (IISD, n/d).

There is a wealth of studies based on sustainable purchase intention rather than actual purchasing behaviour (for example Shrum et al. 1995; Robinson and Smith 2002; Selfa et al. 2008; Vermeir and Verbeke 2008). In addition, papers come from geographically diverse regions, are based on varying consumer groups, and focus on behaviour intentions or self-reported behaviour (for example USA: Bissonnette and Contento 2001; Ellen et al. 1991; Roberts 1996; Robinson and Smith 2002; Shrum et al. 1995 and Selfa et al. 2008. China: Chan 2001. Belgium: Vermeir and Verbeke 2008 and 2006. Canada: Berger and Corbin 1992; Hirsh and Dolderman 2007. UK: Bhate and Lawler 1997 and Diamantopoulos et al. 2003). The literature shows that environmental concern is fairly widespread but often also finds there to be an attitude/intention – behaviour gap, and several authors have highlighted that situational factors can play an important role in purchase behaviour (for example Vermeir and Verbeke 2006, Carrington et al. 2010; Bezencon and Blili 2010; Bray et al. 2011; Belk 1975; Barker and Wicker 1975; Bhate and Lawler 1997; Diamantopoulos et al. 2003; Hobson 2003).

Previous studies have attempted to classify situational factors (Kaiser and Keller 2001; Tanner et al. 2004; Diamantopoulos et al. 2003; Barr 2003, Belk 1975). The assumption is that there is some situational factor or intervention between motivation and actual behaviour that either inhibits or encourages sustainable purchasing. One situational factor that may impede or facilitate sustainable purchasing behaviour is information. The social and environmental impact of a product are credence

attributes which cannot be identified by consumers either before or after purchase (Beltz and Schmidt-Riediger 2010), and so information related to such attributes may impact on awareness and understanding. Bray et al. (2011) notes that information may be an intervening factor between sustainable intentions and consumption. A number of authors note that consumers are constrained in their ethical purchasing decisions not just due to a lack of product information, but also a lack of choice and availability of sustainable products within mainstream retail outlets (Beltz and Schmidt-Ridiger 2010; Sebastiana et al. 2012; Nicholls and Lee 2006; Vermeir and Verbeke 2008). The assumption is that the availability of appropriate information regarding sustainable consumption is crucially important in empowering consumers to take appropriate action and change their behaviour (Markkula and Moisander, 2012). However, too much information is counterproductive and may inhibit purchase behaviour, whereas consumers' perceptions of the quality of information would appear to be far more important in actual ethical purchasing behaviour (de Pelsmacker et al. 2007). It therefore remains a challenge for individuals to negotiate a path through the abundance of sometimes contradictory sustainability related information, and translate knowledge into practice (Markkula and Moisander, 2012).

As a result, measuring what individuals actually do and exploring the reasons behind such behaviour are important factors in understanding how consumers respond to information. However, little is known about the impact of information on actual sustainable purchasing behaviour, as relatively few studies are conducted in the real world of consumers (Bray et al. 2011; Carrington et al. 2010).

Eco labelling

Labelling is one strategy to increase information at the point of purchase. Eco labelling attempts to communicate information to consumers regarding the environmental externalities of global production, with the assumption that concerned consumers can make comparisons, and give preference to products or services that have less environmental impact (Craig Smith et al. 2010; Gertz 2004). The employment of eco-labels as a means to promote sustainable purchasing is debated within the literature. There are several examples of studies whereby eco-labelling has had an effect on consumption behaviour eg Henion 1972, Teisl et al 2002; Srinivasan and Blomquist 2009, Bjørner et al 2004, Tang et al 2004, Grankvist et al 2004) , although often they come with a caveat. In summary, Tang and Fryxell (2004) concluded that any influence from an eco-label will diminish if other product attributes are weak. This is also supported by research that finds that consumers are more likely to purchase such products when they are not required to pay more, sacrifice quality or make a special effort (Carrigan and Attalla 2001; Vanclay et al. 2011).

Criticisms of eco-labelling are also prevalent. van Amstel et al. (2008) assessed five eco-labels in the Netherlands and found that their communication was not reliable. They suggest failures in terms of insufficient information and recommendations, ambiguity and lack of assurance to buyers about the ecological impact of the purchase. Hoogland et al. (2007) note that information will not automatically cause changes in beliefs and purchase intentions across consumers with different values and they suggest that a product label can only help a consumer make sustainable choices if they are able to gain understanding at the very moment of deciding on a purchase. Owen et al. (2007) found UK focus group participants unsure as to whether detailed on-pack labelling would help them, due to the amount of

information they already think about during shopping. Eden et al. (2008) found that UK focus group participants were generally confused and lacked confidence in eco labels.

Carbon Labels

Carbon labels, as an example of eco-labels, are the end result of an attempt to estimate the total amount of carbon dioxide and other greenhouse gases emitted during the manufacture, distribution, use and disposal of a service or product. Carbon labelling attempts to communicate the 'carbon footprint' of a product to those making sourcing decisions within organisations, but also to consumers, thus enabling them to actively participate in sustainable development (Brenton et al. 2009). The aim of the carbon label is to facilitate sustainable purchasing behavior for main stream consumers, by delivering information on the environmental footprint of a labeled product, and offering choices within a category (Gadema and Oglethorpe 2011).

Carbon labelling initiatives began to develop in 2007, often driven by business and/or government support but confined to trials and pilot projects involving the auditing and labelling of limited ranges of consumer products (Hartlieb et al. 2009; Brenton et al. 2009). France, US, Switzerland, Germany, Japan and Korea are examples of countries who became engaged in trial schemes on limited product ranges (Brenton et al. 2009). In 2001, the UK government set up The Carbon Trust, a private company originally set up as a response to the threat of climate change, with the remit to assist both the public and private sector to move to a low carbon economy. The Carbon Trust has developed a number of different types of carbon foot printing initiatives, which aim to measure and certify the environmental footprint of an

organisation, a product or service, or a value chain, and includes a carbon label. The label shows the amount of carbon dioxide (and other greenhouse gases) emitted during the manufacture, distribution, use and disposal of a product - the carbon footprint over its lifecycle (The Carbon Trust 2009a). Launched in 2007, the Carbon Trust note that the role of their label is to allow consumers to "…choose those products that have smaller footprints and therefore contribute less to climate change" (The Carbon Trust 2009b). In 2010, The Carbon Trust claimed that the Carbon Reduction Label has been used on 90 brands, 5,000 products across 19 countries with sales worth £2bn (The Carbon Trust Certification, 2013).

Early research exploring consumers' understanding, attitudes and intentions towards the concept of carbon labelling has been mixed (The Carbon Trust 2010b; Wheatland 2007; Gadema and Oglethorpe 2011). Since the introduction of carbon labelling, there have been a few attempts to examine consumers responses to carbon labels, but these are in terms of attitudes or self-reported behaviour (Gadema and Oglethorpe 2011; Upham and Bleda 2009; Berry et al. 2008). There are no known publically available findings on the impact of carbons labels on actual purchasing behaviour.

In April 2008, Tesco, the largest grocery retailer in the UK, and the third largest in the world, became the only retailer in the UK to introduce the Carbon Trust's Carbon Reduction Label on twenty own label products from four categories (washing detergent, orange juice, light bulbs and potatoes). Later, more products and other product categories (milk, kitchen towel and toilet tissue) were added. This is part of an overall strategic objective to reduce emissions of greenhouse gases throughout the supply chain, including working with own brand suppliers and consumers to help them reduce their environmental impact (Tesco 2012; McKinnon 2010; Brenton et al.

2009). Availability and price directly determine the opportunity structure for consumers to purchase environmentally labelled products (Koos 2011; Grankvist and Biel 2007). It can therefore be assumed that increased availability of carbon labelled products within main stream non-niche categories - by the largest player in the UK food industry - would increase the likelihood of sustainable purchasing behaviour.

Tesco collects information on purchasing behavior via their customer loyalty card scheme, offering an opportunity to measure actual changes in purchasing behaviour. The data consists of continuous rolling weekly point-of-purchase sales data on all products, amounting to over 265,000 product items. The sample size used in the database is ten per cent of the total population of loyalty card holders, which is equal to approximately 1.4 million shoppers. Weekly data on key sales measures for all products sold in Tesco for a period of up to two years can be extracted. Loyalty card data combine the advantages of using scanner and panel data, as data on sales are collected on a large scale, but can also be disaggregated by customer segments. Felgate *et al* (2012) note that loyalty card schemes are a valuable tool in providing data to significantly contribute to the understanding of marketing issues. The advantage of using loyalty card data is that it offers an opportunity to explore how different customer segments have responded to the carbon label trial.

Some preliminary data analysis on the initial trial products using the loyalty card database was undertaken to establish the impact of the carbon label and other limited additional point of purchase information on purchase behaviour. Key measure reports were used to investigate how the sales of carbon labelled products on three

product categories had performed since their introduction – orange juice, potatoes and washing detergent. Reports were run for the carbon labelled products and comparison groups, in order to attribute any changes to the label rather than general trends taking place across a product category. Reports were run for two time periods, both before (June – October 2007) and after the introduction of the label (June – October 2008). The performance measures demonstrated that sales of the carbon labelled products remained in the minority within each of the four product categories, and there was a lack of consistent evidence that overall sales of carbon labelled products had increased, although there were small differences at the individual product level. Shopper profile reports were also generated in order to identify the characteristics of shoppers who had actually purchased carbon labelled products and more importantly, those shoppers who had not. Using the Lifestage segmenting approach (Older Adults, Older Families, Young Adults, Young Families, Pensioners, Multigenerational households) the purchasing data identified an overall lack of significant inclination to purchase carbon labelled products by all groups, with pensioners to be significantly less inclined to purchase carbon labelled products. The main finding is that carbon labels had little effect on purchasing behaviour, but little is known regarding why this should be the case. Further exploratory research is therefore required in order to understand the reasons behind such a result.

In summary, we can conclude that the aim of carbon labelling is to enable consumers to participate in sustainable purchasing behaviour at the point of purchase. Research examining attitudes or self-reported behaviour with regard to carbon labelling has shown mixed results, and the consumer behaviour literature identifies the gap between attitudes and actual behaviour. The aim of this study is to

further explore the role of carbon labelling in sustainable purchasing behaviour within a real world context. In pursuit of this, preliminary exploration of Tesco loyalty card data notes that carbon labels have had little effect on actual purchasing behaviour. However, the reasons behind such findings need to be explored, particularly any differences in perspectives between consumer segments.

Methodology

In order to explore the role of carbon labelling on sustainable purchasing behaviour within the context of the Tesco trial, a series of focus groups were held to gain an appreciation of current levels of awareness, understanding and use of carbon labelling. Focus groups are an appropriate methodology in order to understand differences in the perspectives of different segments, to allow ideas to emerge and when the goal is to appreciate drivers of opinions, motivations or behaviours (Krueger and Casey 2000). A series of focus groups with Tesco shoppers were conducted during September and October 2009. Female participants were recruited given that they are assumed to be responsible for the majority of grocery shopping. To allow for comparisons between different consumer segments, a purposive sample of consumers was required (Morgan 1998), and so participants were recruited according to their level of environmental concern (strong, moderate and none at all) in order to establish differences between segments. Participants were also recruited according to three defined Tesco customer loyalty card database segments, namely Young Adults aged 20-39 with no children; Older adults aged 40-59 with no children, and Young Families with children under ten. Each group consisted of between six to eight female participants (Krueger and Casey 2000), and a total of nine focus groups was conducted. Moderation was non-interventionist, and participants were

encouraged to speak freely and openly. Full transcripts of the audio and video recordings were made. One criticism of focus groups is the reliance on reported behaviour (Gordon 1999) but the focus groups were intended to be an exploration of *why* shoppers behave in a certain way. In particular, the aim of the focus groups was two-fold, namely to gain insight into the role of environmental concern on the actual shopping process, and to explore levels of awareness, understanding and use of carbon labels.

Findings

The overall consensus of the focus groups was that the environment was not a primary consideration for participants when actually in the store, although many reported that it was something they thought about at home, particularly in relation to recycling. Where participants said that they were thinking of the environment in the store, this was often in terms of a dislike of excess packaging, rather than relating to specific types of products they would purchase.

"I do when I think of turning the TV off or something but when I go shopping, I tend to just kind of be thinking about food" (Young Adults, Moderately Influenced)

*"I tend to think of that sort of thing that way (*recycling*), rather than in food shopping"* (Older Adults, Moderately Influenced).

"I think you think about it once you're outside the supermarket, but when you're in there, you're so overwhelmed with other things that perhaps it fall slightly lower down the agenda" (Young families, Moderately Influenced).

"Not as far as that, not as far as greenhouse gases and that….I'm there to shop and get food and put it in my belly, the last thing I'm thinking of is greenhouse gases! I'm

being honest! I don't want to worry about looking at greenhouse gases on a label, I'm being perfectly honest." (Older Adults, Strongly Influenced)

In comparison to other groups, Young Families spoke the most about the influence of others on the shopping process, namely children.

*"My whole shopping list orientates around my daughter and what she can or can't have" (*Young Families, Not at all influenced*).*

*"In terms of like what I'm choosing I go through the kids stuff first…" (*Young Families, Strongly influenced*).*

"If I don't write a list I cannot remember what I need, I literally get in there and my whole mind goes blank. It's a nightmare and the kids are throwing things…" (Young Families, Strongly influenced).

"I hate going with the children because you come away from the list that's in your mind" (Young Families, Not at all Influenced).

The second objective was to explore the awareness, understanding and use of carbon labels. The focus groups revealed that the vast majority of participants reported no recognition of seeing the carbon label on products in Tesco, and not one participant reported the carbon label having any influence on their purchasing behaviour. When shown a large version of the carbon label, some participants thought the label was about recycling, and all expressed confusion regarding the meaning, the purpose of the label and how they were expected to respond to it:

"Those figures don't really, if I'm honest, mean anything to me" (Young adults, Moderately Influenced)

"*the scale, 700g, whether was good or bad, what message they were trying to tell me! I'm assuming it's bad!"* (Young adults, Strongly Influenced)

"don't know what it means" (Young families, Strongly Influenced)

"I have to say that label means something to do with your carbon footprint but 700g per pint (milk) 'shwoosh' gone straight (over my head)... I have no knowledge of what that means" (Older adults, Moderately Influenced).

"I think you need to have a university degree in that to be able to read it" (Young families, Moderately Influenced)

"*Is it telling you not to buy that, and buy the non-bio one... ?"* (Young families, Strongly Influenced)

"*...the word consumption means us eating the loaf doesn't it? So what are they saying that we need to eat it in a certain way to reduce...?*" (Young adults, Not at all Influenced).

Although there was some understanding of the carbon label's connection with carbon footprints and the environment generally, participants lacked understanding of what the carbon label meant. The concept of grams of carbon was particularly problematic for the participants, especially when trying to relate this to something quantifiable that they could understand.

"I don't think people know about CO2 and the impact it has on the environment, I think there's a bigger issue where people need to be educated" (Young families, Strongly Influenced).

"*I think they need to define what they mean by, somebody needs to define carbon footprint. Does it mean eco-friendly? Or is that something completely different? As a term I kind of get it but I don't get it enough to make me buy those products*" (Young families, Not at all Influenced).

"The problem I have with this I can't really put it into context, I don't know how it relates to other things. OK its 700g reduce it by 60 so it's then going to be 640 well,

what does that mean in the big scheme of things?" (Older Adults, Strongly influenced).

"Don't know what it means" (Young Families, strongly influenced).

Overall, participants lacked awareness, understanding and use of the carbon label across all focus groups. An overwhelming response from participants was the need for education as current understanding was poor, and participants commented on the lack of education, government effort or media focus on carbon labels:

"You see the salt sign, because it's that's drilled into us, not drilled into us but it's been such a big thing through the government and everything…" (Young Adults, moderately influenced)

"It feels like a token gesture rather than a big commitment" (Young Families, not at all influenced).

"I don't think people know about CO_2 and the impact it has on the environment, I think there's a bigger issue where people need to be educated" (Young Families, strongly influenced).

"I think the point is no ones explained it…so that's why it doesn't mean anything to any of us….because no one's said…… We don't know so why should we do anything about it?" (Young Families, moderately influenced).

The focus group participants also debated the whole concept of where responsibility should lie for sustainable purchasing behaviour. Some participants felt strongly that environmental protection, in particular the negative impacts of excess food packaging, is the responsibility of the manufacturer and supermarket, and appeared to resent the onus on consumers. Young Families in particular were in favour of

'choice editing' whereby retailers take responsibility to edit out less sustainable products on behalf of consumers (Sustainable Development Commission, 2006).

"*...only stocked products where they'd taken into account the carbon footprint... would take the responsibility off of us and we wouldn't have to worry about that, because we've got enough to worry and think about*". (Young Families, Not at all Influenced).

"Why don't the supermarkets if one is less carbon footprint, why don't they just go for the option that is better and reduce money that way, rather than giving us 20,000 options and making us choose". (Young Families, Moderately influenced).

Discussion and Conclusion

The aim of this study is to examine the role of carbon labelling in retail supply chains in response to calls to examine sustainable purchasing behaviour within a real world context (Bray et al. 2011; Carrington et al, 2010; Andorfer and Liebe 2012). The extensive own brand trial by Tesco overcomes some of the lack of availability, price and within-category choice constraints that have been identified as possible constraints on sustainable purchasing decisions within mainstream retail outlets (Beltz and Schmidt-Ridiger 2010; Gadema and Oglethorpe 2011; Sebastiana et al. 2012; Nicholls and Lee 2006; Vermeir and Verbeke 2008). Examining the Tesco supermarket purchasing data of carbon labelled products over time has demonstrated that there has been little impact in terms of encouraging sustainable purchasing behaviour within main stream product categories and across various consumer segments. Given this evidence, the findings from the focus groups identified possible reasons behind this lack of impact: lack of awareness and understanding of carbon labelling; constraining or facilitating social and cultural

influences, and the hetereogenous nature of consumers. The findings have important implications for a number of stakeholders.

Given the scale of the environmental challenges associated with the sustainable development of our global food system, collaboration between industry, government and society are necessary in order to share information and develop quicker, easier and more cost effective methods of measuring, reducing and communicating the carbon footprint of a product along the supply chain. Food retailers' who adopt an own brand strategy can utilise their relationships with suppliers further by working collaboratively with suppliers, and sharing consumer insight, to develop targeted information strategies to raise awareness, improve understanding and ultimately change behaviour. An alternative strategy for retailers is to respond to those consumers who feel they should not be held responsible for sustainable consumption. A strategy of 'choice editing' and mainstreaming of a carbon labelling approach that is designed as a 'stamp of approval' rather than for comparison purposes may be more effective.

Given the significant need for increasing understanding about environmental issues in general, and carbon emissions in particular, policy makers may develop social marketing campaigns taking into account the heterogeneous nature of the population. As an example, this research noted that families with young children identified the important influence of their children on the shopping process; therefore introducing the topic of carbon measurement and foot printing into the educational curriculum may lead to a positive change in sustainable purchasing behaviour for

this segment over time. Further research could explore how to effectively engage other consumer segments.

We acknowledge the limitations of a research approach that relies on a small sample of consumers, in terms of generalisability of findings. However, the aim was to explore the role of carbon labelling within a real world setting, and to open up further avenues of debate and research. Given the challenges associated with the environmental consequences of global production and consumption, exploration of strategies to reduce carbon emissions continues to be of importance.

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