Consumer confusion with profusion of environmental labelling: Need for an alternative climate labelling to reduce carbon footprint?

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Abstract

"Responsible consumption and production" and "climate action" are two of the seventeen Sustainable Development Goals (SDGs) of the United Nations for promoting individual and collective actions to combat climate change and not to vulnerate the needs of future generations. One of the challenges of reaching these goals is to reduce global carbon dioxide (CO_2) emissions and other greenhouse gasses (GHG), which continue to rise. The need to study alternative interventions for reducing carbon emission is well addressed in the literature, where environmental labelling is one such tool that can be used to stimulate greater consumer demand for goods and services with low or no environmental impacts. While the expected effect size of environmental labels on consumer demand is generally modest, even a relatively small change in consumer purchasing behavior could significantly reduce GHG emissions at the population level. Labels are primarily consumer-focused interventions and so their effectiveness largely depends on consumers' attention, understanding, and use of the label in their purchase decisions, though labels can have significant impact on other actors in the supply chain that produce, transport, and sell products. However, the existing labels have not been reported to be very successful as a behavioral intervention tool to shift consumption behavior towards climate-friendly consumption. Part of the reasons identified in some studies is the increasing number and variations of labelling types triggering consumer confusion. This paper identifies the major deficiencies of existing environmental labelling schemes from consumers' perspectives including profusion of alternative labelling schemes, information framing, label designs, source credibility and green washing, and individual versus collective benefits. The paper concludes with highlighting possible paths forward for enhancing labels' effectiveness to induce behavior change contributing to reducing consumption related carbon footprint.

Keywords: carbon footprint; climate change; consumer behavior; eco-labelling; sustainable marketing

1. Introduction

"Responsible consumption and production" and "climate action" are two of the seventeen Sustainable Development Goals (SDGs) of the United Nations for promoting individual and collective actions to combat climate change and not to vulnerate the needs of future generations. One of the challenges of reaching these goals is to reduce global carbon dioxide (CO_2) emissions and other greenhouse gasses (GHG), which continue to rise (Le Quéré et al. 2018). For example, one of the powerful sources of GHG is methane (CH_4) which is responsible for 23% of the global warming produced by all GHGs. CH_4 emissions have risen by nearly 10% over the last two decades, jeopardizing the target of Paris Agreement to keep the warming level at 1.5-2°C. What is more concerning is that human activities account for about 60% of the total global methane emissions, largely from fossil fuel, agricultural, and waste sectors (Future Earth 2020).

The need to study alternative interventions for reducing carbon emission is well addressed in the literature, where carbon labeling is one such tool that can be used to stimulate greater consumer demand for goods and services with low carbon emissions (Liu et al. 2016), as well as further incentivize the supply of such goods and services (Vandenbergh and Gilligan 2017; Vandenbergh and Nielsen 2019). In principle, carbon labelling is a specific type of environmental labelling that is used to inform consumers about the carbon emissions induced throughout the supply chain of products. Carbon labels address a key information deficiency as consumers are currently unable to obtain reliable information about how the carbon emissions associated with the products they purchase. Consequently, by providing such information, carbon labels are expected to steer consumers toward products with a low carbon footprint. While the expected effect size of such labels on consumer demand is generally modest, even a relatively small change in consumer purchasing towards low-carbon alternatives could significantly reduce GHG emissions at the population level (Vandenbergh, Dietz, and Stern 2011).

Carbon label is just one specific category of environmental labelling system that discloses carbon footprints of relevant products. There are other environmental labelling schemes including energy efficiency and organic labels. In fact, there has been a six fold increase in the number of eco-labels between 1990 and 2010 (Gruère 2014) with a total of 456 eco-labels in 199 countries and 25 industry sectors in 2022 (Ecolabel Index 2022).

The proliferation of environmental labelling with variations in shape, design, color, type and level of information, endorsement etc. raises the concerns for different labelling schemes' effectiveness in influencing relevant behavior change aiding to climate change mitigation. In case of carbon labelling, for example, many studies reported that even the consumers in forefront countries (e.g. UK, New Zealand, Finland, Singapore) have relatively strong demand for carbon labels, but consumer confusion in understanding and interpreting carbon labels remains a common problem (Guenther et al. 2012; Hartikainen et al. 2014; Hornibrook et al. 2015). This perspective paper adds to the literature by identifying the major deficiencies of existing environmental labelling from consumers' perspective and proposing some paths forward for enhancing the effectiveness of environmental labelling to induce relevant behavior change in reducing consumption-related carbon footprint.

2. Deficiencies of Existing Environmental Labelling: Consumers' Perspective
2.1 Profusion of labels

One of the goals of using environmental labelling is to reduce information asymmetry between the producers and consumers (Delmas 2010; ISO 2012). However, consumers can be confused by eco-label terminology (Robertson and Marshall 1987), even in instances when significant investments in promoting the eco-labelling scheme have been made. One of the reasons of consumer confusion is the fact that environmental labelling schemes often use the same terminology differently (Czarnezki et al. 2014; D'Souza et al. 2006).

The emergence of large number and varieties of ISO certified eco-labels (over 460 as of August 2018) has triggered consumer confusion in recent years, questioning the current sufficiency of ISO-14020 (with minor modifications through ISO-14021 and ISO-14024) series which has been in existence for 20 years now without substantial revision (Minkov et

al. 2020). The efficacy of ISO classifications of eco-labels is also questioned in a report by OECD (Organization for Economic Co-operation and Development), suggesting ISO to look at additional standards covering all types of environmental labels (Gruère 2013). Consumer confusion is further fuelled by different "unidentified" environmental labels which are not recognized and described by ISO or any other authentic classification approach (Minkov et al. 2020), triggering the concern of "greenwashing".

2.2 Level of information and label design
Different consumers may need for different forms and levels of information. The need and processing of information may vary depending on the environmental consciousness and/or knowledge of the consumers. Environmentally concerned and knowledgeable consumers are likely to have greater need for information about environmental quality of the product as well as they are more likely to process such information more efficiently than those general price-sensitive consumers who might find such information too complex (Meyerding et al. 2019). One study on carbon labelling suggests that some consumers had relatively high preference if labels allowed comparisons (Hartikainen et al. 2014), which was further verified by Emberger-Klein and Menrad (2018) and Feucht and Zander (2018), suggesting that detailed explanation of labelling improvement was effective in stimulating consumers to purchase carbon-labeled products. Consumers value on-site explicitness of the label (clear, simple, recognizable) (Eijgelaar et al. 2016).

Former studies also highlighted the importance of visualization and design of labelling, some suggesting negative labelling (e.g., in red color) is more effective in altering consumer behavior than positive labelling (Grankvist et al. 2004; Meyerding et al 2019). Logos capture relatively more visual attention than text-based eco-labels (Rihn et al. 2019). Former studies on carbon labels reported specific design to be responsible for labels being not successful (Gadema and Oglethorpe 2011; Kortelainen et al. 2016; Meyerding 2016; Schlich 2012) and called for investigating the effectiveness of simpler carbon labels in future research (Kortelainen et al. 2016).

2.3 Collective versus individual benefits
Former studies on carbon labels argued that consumers might be indifferent to carbon-labelled products, as such labels are limited in providing direct individual benefits to consumers (Cohen and Viscusi 2012; Liu et al. 2016; Spaargaren et al. 2013). Studies also suggest that carbon label information becomes meaningful when other purchasing criteria (e.g. price, taste) are satisfied (Hartikainen et al. 2014).

Another major challenge of reducing consumption related GHG emissions involves how to gather information about product supply chains and to use such information for benefiting the firms and facilitating consumers' environmentally informed purchase/consumption decision (Isley et al. 2016). Many firms are reported to withdraw from sustainability certification schemes due to a lack of market benefits, high administrative workloads, or bureaucratic burdens (Dunk et al. 2016; Margaryan and Stensland 2017; Mzembe et al. 2020).

2.4 Credibility (greenwashing)
Recent studies suggest consumers' willingness to pay is no longer a big problem; rather many consumers are willing to pay certain premium for low carbon or environmentally friendly products (Echeverria and Moreira 2014; Feucht and Zander 2018), but they find label information confusing (Roe et al. 2014; Upham, Dendler and Bleda 2011). A recent study also reported that consumers' willingness to buy can be enhanced if consumers can understand the label and find the label credible (Li et al. 2017).

2.5 Presentation of information
The type and the way of presenting the information can have variant effect on consumer choices. Recent experiment on consumers' car choice indicates that the information has stronger effect on consumers' choice of low-emission and high fuel-efficient cars when NO_X

tax and CO_2 tax are combinedly presented (Choisdealbha et al. 2020). Consumers also use labels and visual cues as a guide to make their judgments on environmental quality of the product (Herbes et al. 2020; Magnier and Schoormans 2015; Scott and Vigar-Ellis 2014). One study reports that 44% of the consumers relied on information on the label and another 30% made judgments based on image or logo embedded on the package, with natural brown and green colors being perceived as environmentally friendly (Scott and Vigar-Ellis 2014). Some studies reported that consumers tend to purchase low-CO2 products when the label is coupled with local origin (Akaichi et al. 2013; Onozaka and Mcfadden 2011) while others found label having more positive impact when carbon logo is combined with health logo (Hoek et al. 2017). In line with this, Gossling and Buckley (2016) suggested improving the carbon label effectiveness by endorsing quality, referring low carbon products as higher quality products.

3. Paths Forward to Enhance Label Effectiveness
3.1 Label endorsement
Consumers are sometimes sceptical about environmental labelling, especially when the sources are not perceived as credible (Taufique et al. 2017). This is also coined with 'greenwashing' ('disinformation disseminated by an organization so as to present an environmentally responsible public image' – Concise Oxford English Dictionary 2010) that deter consumers from undertaking pro-environmental consumption behavior (Chen and Chang 2013). Some studies argue that third-party verified environmental labelling can achieve higher levels of consumer trust (Atkinson and Rosenthal 2014; McCluskey 2000). Third-party labelling has also been reported to be the most effective tool to gain competitive advantage in consumer market where individuals are well aware and informed about environmental issues (Testa et al. 2015). In another study, Darnall et al. (2017) reported that independently endorsed environmental labels have the strongest rules and monitoring system. In this case, private sector can be more powerful than public sector in setting standards for labels (Bullock 2015).

3.2 Information metrics
Reliable and valid information metrics can aid in combatting greenwashing, as it helps consumers to evaluate firms' environmental claims (Cialdini 2007; Taufique et al. 2022). Detailed quantification of environmental information (e.g. carbon emissions) may assist sophisticated consumers for comparisons across products and facilitate implementing supply-chain requirements (Taufique et al. 2022). Although such quantifications require access to relevant data, this may enhance consumers' informed choices for pro-environmental consumption. This is especially important for high environmentally-intensive products.

3.3 Label design and visualization
Optimization of life cycle assessment for labelling accreditation, improvement of labelling visualization (e.g. design, placement on the package for consumer products), and normalization/standardization of various environmental labels are recommended to promote sustainable consumption (Minkov et al. 2020; Zhao et al. 2020). Former studies also highlighted he importance of visualization and design of labelling, some suggesting negative labelling (e.g., in red color) is more effective in altering consumer behavior than positive labelling (Grankvist et al. 2004; Meyerding et al. 2019). Logos capture relatively more visual attention than text-based eco-labels (Rihn et al. 2019). Many former studies reported specific design to be responsible for labels being not successful (Gadema and Oglethorpe 2011; Kortelainen et al. 2016; Meyerding 2016; Schlich 2012) and called for investigating the effectiveness of simpler labels in future research (Kortelainen et al. 2016).

3.4 Data protocol
Firms should develop a clear data protocol that allows to convert complex environmental data into meaningful and relevant labelling information to ease consumers' comprehension

and understanding of labelling information. Effort is needed to keep the labelling system transparent and trustworthy across the product life cycles from material extractors to final consumers and waste disposers (Taufique et al. 2022). Interests of both the firms (e.g. costs) and the consumers (e.g. ease of understanding the label) need to be taken into consideration. Data protocol should also be prioritised for products with high environmental intensity (Shewmake et al. 2015; Taufique et al. 2022).

3.5 Experimentation
Environmental information involves different levels of complexities and details. Similarly, different consumers may have different levels of environmental knowledge, concerns, and need for information. The information needs may also vary across product categories. Accordingly, labelling schemes should undergo adequate experimentation to design and modify the labels tailored to the product category and target market. This incremental process can inform future improvements via social learning (Henry 2009), providing an understanding of the influences of labelling across the actions of different actors such as consumers, producers, and other supply-chain actors (Taufique et al. 2022). Such program is already implemented for quantifying product carbon footprints such as PAS 2050 (BSi and Greenhouse Gas Protocol 2021).

3.6 Awareness Building
From consumers' end, there is a lack of recognition or concern about environmental impacts of food related carbon emissions, which is largely due to the common misperception that food industry is free from carbon emission (Birkenberg et al. 2021; Camilleri et al. 2019; Hartikainen et al. 2014). Recent study also reports that people underestimate greenhouse gas emissions associated with air travel and meat consumption (Wynes et al. 2020). Awareness-building policies are needed to make labels an effective market intervention tool at consumer level for agri-food sector (Birkenberg et al. 2021; Canavari and Coderoni 2020; Li et al. 2017) as well as for other sectors like tourism (Gossling and Buckley 2016).

4. Conclusions
One of the main objectives of this paper was to identify the major drawbacks of existing environmental labelling schemes from consumers' perspective. The paper then identified possible path ways to enhance the labels' effectiveness in inducing relevant behavior change towards climate-friendly consumption behavior. The study was conducted on desk review of the recent literature on environmental labelling, especially on its effectiveness from consumers' perspective as well on the authors' recent research work on specific environmental labelling schemes (e.g. carbon labelling, energy efficient labelling). As a perspective manuscript, this paper is not based on any systematic review which the author considers a major limitation of the paper. The author believes that this paper adds to the existing literature by pinpointing the major discrepancies of existing environmental labelling system and by put forwarding possible path ways that open avenues for future research to enhance environmental labelling's consumer effectiveness.

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