# Conditions for the effectiveness of labelling:
## a systematic literature review

Marleen Onwezen - Liam Dwyer - Theresa Fox - Harriette Snoek

WAGENINGEN
UNIVERSITY & RESEARCH

# 1. Knowledge desk sustainability information

'*Which forms of sustainability communication are effective to support consumers in making sustainable choices?'*

Worldwide, and also specifically in the Netherlands, we are confronted with a range of dietary related sustainability issues, ranging from environmental welfare, animal welfare to social welfare. Investigating and understanding consumers' behaviour related to food is crucial to support dietary transitions towards more sustainable choices. Sustainability is a complex concept for consumers. Product communication by means of labelling supports consumers in making informed purchasing decisions and at the same time provides an incentive for producers to adopt more sustainable production practices (Meis-Harris et al., 2021). Efforts by previous research and initiatives concerning communicating sustainability are not bundled yet. In this factsheet, we present an exploration of the existing scientific knowledge by means of a systematic literature review. We do this to provide insight and recommenda-tions on how sustainability information can support consumers' sustainable choices. Our main focus is to synthesise current studies on sustainable product support via labels, labelling systems or classifications. Moreover, we include a broader look to also indicate how the development and use of labels can be further supported with generic knowledge on behaviour change.

Together with the Ministry of Agriculture, Nature and Food Quality we decided to define sustainable food as *food in which the environment, animal welfare and/or social aspects have been considered during production and processing to a greater extent than is required* by law (Logatcheva, 2021; ACM, 2021).

A systematic literature review was conducted on 2 August 2021 with a focus on environmental welfare, social welfare, animal welfare, consumers, food and communication (See Figure 1). We only included Western, peer-reviewed articles from related journals with a focus on the provision of sustainability information related to consumer's willingness to pay, behaviour or formation of attitudes in relation to food products. Other articles were excluded (for a detailed overview, see appendix A).
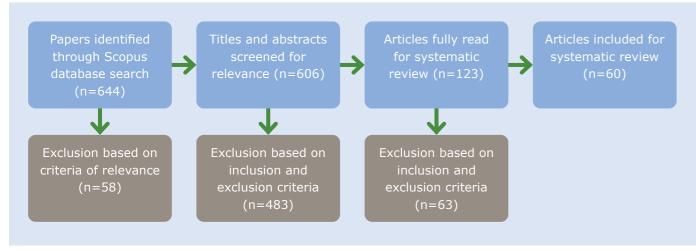


Figure 1: Flow chart of the systematic literature review

# 2. Descriptive statistics

The articles included in this review vary in terms of geographical origin and types of products (see Figure 2 and Figure 3). Further details about the descriptive statistics can be found in Appendix B. A table summarising the literature used in this review can be obtained upon request.

A wide range of explanatory variables were included in the selected studies. Based on the various dependent variables and how often these are studied we can draw three main conclusions:

1. There is a focus on **cognitive variables**, such as presence of information, product attributes, and knowledge. Indicating that most studies include a measure showing the added value of labels to signal the level of sustainability. Much less focus is on affective or more unconscious variables, which do seem a promising route.
2. Attitudes and presence of product attributes are also included in a majority of studies showing that many studies explore the added value of labels to **increase the attractiveness** of a product in various domains.
3. Consumer involvement, trust and motivation reveal a domain in which labels can support **consumer engagement** towards products.
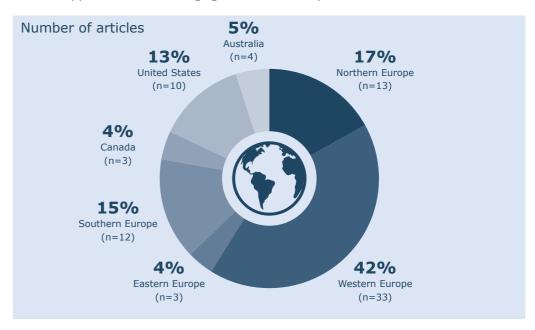


Figure 2: Number of articles per geographical region



Figure 3: Product types included in the systematic review

# 3. Insights about effectiveness of labelling

## 3.1 Comparing different labelling systems shows a careful indication of the effectiveness of combined labelling

In general, not many studies include a comparison across different labelling systems. The studies that include a comparison show the added value of a fair trade label (Rousseau, 2015), and EU labelling system (De Canio and Martinelli, 2021) over organic labels. A combined message including health and environmental benefits was effective (Jacobs et al., 2018; Verain et al., 2017; De Bauw et al., 2021), whereas a combined label of organic, fair trade and carbon neutrality was less effective in influencing consumers' preference for sustainable bananas than a stand-alone organic or fair trade label (Sporleder et al., 2014). This shows careful indications towards the importance of combined labelling.
A full overview of the effectiveness of individual label systems is found under Appendix C.

## 3.2 In general we can conclude that more articles show an effect of labelling (compared to no labelling)

Though some nuanced differences can be seen, this positive effect seem strongest for communication of a fair trade logo (see Figure 4). Moreover, the combination of health and sustainability communication consistently show positive effects.
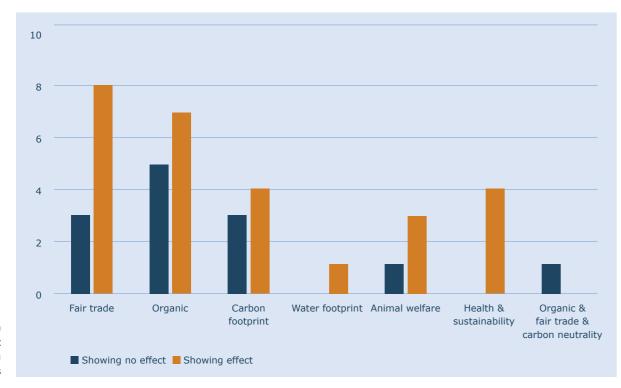


Figure 4: Comparison of different labelling systems

## 3.3 Labelling shows some effectiveness on associations and behavioural outcomes (18%)

Most of the included studies show an incremental value of adding sustainable communication on products. With regard to this, two types of dependent variables (see Appendix D): associations and behavioural measures are considered. Regarding *associations*, the findings indicate the relevance of different associations that consumers have with labels. Taken together, the findings indicate that sustainability labelling might increase clarity on sustainable impact (Panzone et al., 2020) and have a positive influence on perceived quality of specific products (e.g., Van Hoorn and Verhoef, 2011) and product attributes like taste and perceived naturalness (Sörqvist et al., 2013; Schouteten et al., 2021).
Regarding *behavioural measures*, labelling generally increases awareness of sustainable products and willingness to pay for sustainable products (Menozzi et al., 2020; Akaichi et al., 2019; Maaya et al., 2018), though the association with sustainable behaviour was generally smaller (Piester et al., 2020) or not present (De Blauw et al., 2021; Robinson et al., 2002; Grunert et al., 2014). To illustrate, the effect sizes are generally small and the impact on actual food choices is only scarcely explored. The singular effect size ranges from .01 to .37, with on average 18% of consumer acceptance of products explained by adding a label. The aggregate effect size ranges from .10 to .72 and averaging a 43% of consumer acceptance of products explained by multiple predictive variables together (thus also including non-behavioural measures).

## 3.4 Labels are not always understood

Besides *associations* and *behavioural outcomes*, a large body of articles explored how labels are *perceived*. These studies indicate that labels are not fully understood (De Pasquale et al., 2014; Pomarici and Vecchhio, 2014; Grunert et al., 2014; Gadema and Oglethorpe, 2011), not trusted (Rousseau, 2015), or that different product attributes from sustainability, such as price or origin, are the deciding factors when purchasing food products (Robinson et al., 2002; Gadema and Oglethorpe, 2011; Zakowska-Biemand and Tekień, 2017; Lamper et al., 2017). But even if a logo is not fully understood, it can have an impact on both associations and willingness to pay (De Pasquale et al., 2014). Additionally, strategies to increase understanding of labelling systems might further increase effectiveness (Samant and Seo, 2016; Van Loo et al., 2017; Peschel et al., 2016). This, in turn, may lead to familiarity with different labels, which has been found to increase willingness to pay for sustainable products (Kaczorowska et al., 2019).

## 3.5 Trust and clarity are preconditions for effective labelling

When certification bodies are trusted, intention to purchase labelled products increases (Beldad and Hegner, 2020; De Canio, Martinelli and Endrighi, 2020). In this regard, consumers prefer independent organisations as certification body over supermarkets or government agencies (Sporleder et al., 2018). A lack of trust in labelling systems leads to a lower or negative willing to pay for labelled products (Rousseau, 2015). Clarity of labels, as opposed to ambiguity, helps consumers to understand labels and facilitates a match between labels and existing knowledge about sustainability or labelling (Lanero et al., 2020; Peschel et al., 2016). Failure to provide a clear label may lead to information overload, which occurs as a result of adding multiple similar labels or labels with extensive amounts of information (Di Pasquale et al., 2014; Mancini et al., 2017).

## 3.6 Comparing different labelling systems: acceptance increases when combining labels or targeting consumer groups

**Environmental welfare**

Regarding the effectiveness, the results are generally positive, though there are some mixed findings. Differences between environmental labels were small or not present (e.g., organic, and fair trade; Chen et al., 2018), though 'no pesticides' and 'water footprint' are generally positively evaluated. There are mixed results regarding consumers' willingness to pay for organic products (De Canio and Martinelli, 2021; De Canio et al., 2020; Maaya et al., 2018). Several studies report that consumers are indeed willing to pay more for organic certified products as opposed to unlabelled products (Tebbe and Blanckenburg, 2018; Sörqvist et al., 2018; Van Doorn and Verhoef, 2011). Meanwhile, Polish consumers were not willing to pay more for organic products (Kaczorowska et al., 2019). The results show some conditions which increase effectiveness:

- *Specific target groups:* Carbon footprint labelling is especially positively evaluated by consumers that are involved in sustainability and young consumers (Apostolidis and McLeay, 2019; Vecchio and Annunziata, 2015). Next, consumers who are concerned about the environment are willing to pay a price premium for products with an organic label (De Canio and Martinelli, 2021).
- *Adding additional label information:* Addition of a traffic light system for carbon footprint labelling led to more sustainable choice behaviour (Osman and Thornton, 2019). Providing information about animal welfare in addition to environmental benefits increases the demand for organic products (Akaichi et al., 2019).
- I*ntention-behaviour gap:* Behavioural studies indicate that the addition of an organic label does not translate the intention to buy organic products into more sustainable behaviour (Lazzarini et al., 2008).

**Animal welfare**

Consumers are familiar with the animal welfare label (Grunert et al., 2014). The addition of an animal welfare label leads to a higher willingness to pay and intention to purchase more animal friendly products (Cornish et al., 2020; Zakowska et al., 2017). These labels seem especially effective for specific consumer groups.

- Although the animal welfare label is familiar, most consumers do not have much knowledge about animal welfare conditions. Higher educated consumers benefit from provision of more detailed animal welfare information on products (Di Pascale et al., 2014).
- Consumers who feel moral obligation to buy animal friendlier food and consumers who do see animal welfare as a relevant food attribute generally have a positive evaluation of products with an animal welfare communication (Beldad and Hegner, 2020; Castellini et al., 2020).



Environmental labels    Animal welfare labels    Social welfare labels

**Social welfare**

Adding a fair trade label increases liking and preference for sustainable food products (Schouteten et al., 2021; Maaya et al., 2018). Multiple studies confirm that consumers are willing to pay a premium price for food products with a fair trade label (Tebbe and von Blanckenburg, 2018; Maaya et al., 2018), as well as the likelihood that this translates into more sustainable choice behaviour (Rousseau, 2015). Again here, Polish as well as unconcerned consumers are not interested in purchasing fair trade labelled food products (Kaczorowska et al., 2019; Grunert et al., 2014).

## 3.7 Labels are more effective for some specific consumer groups

*Informed consumers:* labelling seemed in general most effective to informed and well-educated consumers.

*Motived consumers:* consumers that are already motivated and mindful to engage in sustainable behaviours are more affected by labelling.

*Younger and older consumers:* a considerable number of studies report on the effectiveness of labelling for young or old consumers. These findings are both mixed and inconsistent.

*Female consumers:* women on average, compared to men, were found to attribute more value to food sustainability. More information can be found in Appendix F.

## 3.8 Increasing the effectiveness of labelling strategies with additional strategies

Several strategies to increase the effectiveness of labelling systems are presented in the different studies.

**Traffic-light labelling** improves consumers' ability to choose for a more sustainable option.

For many consumers, sustainability is a **complex** and **abstract** concept. Emphasising the attributes of abstract concepts such as 'sustainability' and 'organic' more concretely could be a promising strategy to further promote sustainable choice behaviour.

Emotions play an important role in the choice for sustainable food. **Emotive communication** increases purchase propensity more effectively than rational or neutral messages.

# 4. Promising routes to increase knowledge and improve labeling, targeting and interventions

We complement our findings on how to effectively communicate about sustainability with insights from literature reviews on sustainability communication and behaviour change. In total, 11 literature reviews are used to identify promising routes for behaviour change and sustainability communication. The search for overviews was restricted to the time range from 2014 to 2021 to ascertain updated results.

## 4.1 How to communicate sustainability information

Several reviews concluded that consumers do not properly understand sustainability labels at this moment (Asioli et al., 2020; Rondoni and Grasso, 2021).

The confusion can in part be attributed to the avalanche of different labels. This might lead to the adoption of the heuristic *'a labelled product is better than one without label'* (Vandenbroele et al., 2020).

We suggest theory-based strategies to increase the understanding and effectiveness of sustainability labels and logos:

**Use simple and short messages**
Grounded in the *Transaction cost theory:* 'If the opportunity cost of processing information is higher than the marginal benefits to be gained from the information, consumers just ignore the information' (Verbeke 2005).

**Make sustainability issues concrete and close to the self**
Climate change is a fairly abstract and vague phenomenon for many people, and the relationship with the self and daily reality is not evident. Therefore, it might be very effective to make climate change more tangible and urgent by pointing out the concrete relationship to the self and the present (Ejelöv et al., 2018). This strategy in grounded in construal level theory. *Construal Level Theory:* the subjective distance between people and an object or an issue like climate change is closely linked to how abstractly this object/issue is mentally presented ('construed'). Communication strategies should try to overcome abstract, generic representations of climate change and subjectively approach it to the self. We will focus on concrete communication in the following.



**Make the consequences of personal purchase decisions concrete**
Even if sustainability topics appear urgent and clear, and consumers care about the environment, people might still have the feeling that their sustainable actions are simply a 'drop in the ocean' because individual pro-environmental behaviour typically has no immediate noticeable consequences (Meijers et al., 2021). Several behavioural change theories like *Social Cognitive Theory,* the *Extended Parallel Process Model,* and *Protection Motivation Theory* therefore emphasise the importance of strengthening the belief in the link between someone's behaviour and environmental consequences, also called *'response efficacy beliefs'* (Bandura, 1977; Bockarjova and Steg, 2014; Rogers, 1975; Witte, 1992). In this regard, interactive pop-ups displaying messages that conveyed the impact of sustainable food choices have shown to positively influence response efficacy beliefs in a VR environment (Meijer et al., 2021). In turn, these response efficacy beliefs increased pro-environmental food choices in the VR and in real life 2 weeks later. See Figure 5 below for the messages used in Meijers et al. (2021).



These biscuits do not contain palm oil, but instead, contain sunflower oil. Sunflower oil does not contribute to deforestation. These biscuits therefore *decrease* the chance of deforestation.

These biscuits contain moderate amounts of palm oil. The production of palm oil contributes to the deforestation of rainforests. These biscuits therefore *moderately increase* the chance of deforestation.

These biscuits contain high amounts of palm oil. The production of palm oil contributes to the deforestation of rainforests. These biscuits therefore *highly increase* the chance of deforestation.

Figure 5: Response efficacy beliefs related to sustainability

Note. It did not matter for the effectiveness of the messages if they appealed to environmental or health consequences, and if they were used with or without pictures.

**Highlight sustainability benefits in a detailed way**
Scientific findings suggest that messages portraying benefits of organic food in a detailed way increase message credibility in comparison to abstract messages (Jäger and Weber, 2020). Moreover, these detailed descriptions worked best when underlining the environmental benefits instead of health benefits. Consequently, it appears most effective to combine messages (referring to the environment, animal welfare and social welfare (benefits related to others) with concrete information.

| Abstract information | 'Environmentally aware and greener: The organic cultivation of organic apples is better for nature and the environment in the long term. In order to be able to enjoy nature in the future, it is important to deal with it in a sustainable way.' |
| --- | --- |
| Concrete information | 'No pesticides or chemical fertilizers may be used in the cultivation of organic apples. This protects biodiversity. For example, there are 30% more bees on organic orchards - and without bees, every second product in your supermarket would no longer exist.' |

Source: From Jäger and Weber (2020)

**Keep differences across individuals in mind when using concrete communication**

Individuals might differ in their associations with sustainability. In general communication is most effective when it fits the level of abstractness:

Detailed communication has especially good effects on people with concrete mindsets. On a good note: detailed communication does not seem to harm people with an abstract mindset either – it likely just does not affect their product evaluation as much (Reczek et al., 2018).

However less tangible information about sustainability, i.e. that is further away from the self, sometimes appears beneficial for consumers with a chronic abstract mindset: for example, highlighting the future (vs. focusing on the present) in advertisements for sustainable products may result in more positive product evaluations for such consumers (Reczek et al., 2018).

Concrete visualizing strategies may backfire for conservatives, less-efficacious people, and people who are low in self-transcendent values. For these groups, abstract visual messaging strategies might be more useful (Duan et al., 2021).

## 4.2 Promising label designs

**Find the right balance between simple, but relevant sustainability information**

Level of information. A sustainability label should primarily be simple and directive to spare consumers time and cognitive effort (Asioli et al., 2020). Complying with this requirement, the organic label is a good example. It's popularity might also partially stem from higher familiarity and awareness (Bastounis et al., 2021; Cecchini et al., 2018; Vanhonacker and Verbeke, 2014).
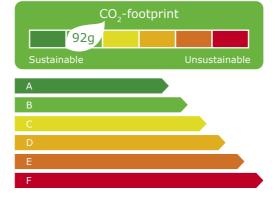
Multi-level system. At the same time, people desire information as they recognise that sustainability is a complex issue (Asioli et al., 2020). In this regard, **multi-level systems** are useful to indicate levels of animal welfare. For example, the intermediate options of the Dutch animal welfare label 'Better Life Hallmark' have gained a large choice share (Janssen et al., 2016).

Another successful multi-level concept that integrates a *visual component* is **colour-coding** (Rondoni and Grasso, 2021; Vandenbroele et al., 2020). As noted in Section 3, traffic lights have been successfully implemented to make carbon footprint more tangible. For example, traffic lights could increase green-labelled meat dishes by 11.5% (Rondoni and Grasso, 2021). A promising way to further *enrich traffic lights* is the addition of **numeric symbols.**



Source: Rondoni en Grasso (2021)

**Careful suggestion towards combined labelling**

Taken together studies show a careful suggestion for increases in preference and willingness to pay for combined labelled products (Tobi et al., 2019). Three examples of combined labelling are:

**1.** The combination of the eco-, fair trade and carbon footprint label is more favourable for willingness to pay than separate use (Rondoni and Grasso, 2021).
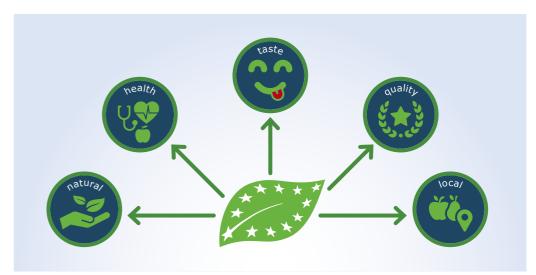


Note, however, that the findings of our systematic literature review revealed that a combination of these labels led to a lower preference for sustainable bananas. Thus, combining eco-, fair trade and carbon footprint labels might be beneficial for behavioural parameters (like willingness to pay) while having negative effects on attitudinal parameters (like preference; see Section 3).
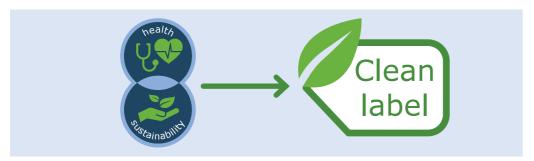
**2. Eco-labels**, particularly the EU eco-label, has been shown to be preferred over other specific sustainability labels (Vandenbroele et al., 2020). The eco-label is associated with a wide range of positive associations, like taste, general quality, health, naturalness and local production (originating from the halo-effect, Ketelsen et al., 2020; Rondoni and Grasso, 2021; Vandenbroele et al., 2020; Tobi et al., 2019). Especially the link with health benefits seems to be prevalent in the consumers' mind (Rondini and Grasso, 2021; Vandenbroele et al., 2020) corroborating the notion of combined health and environmental information being effective, which has also been supported by the systematic literature review (see paragraph 3).

**Linking with ego-centric attributes** can thus be effective, though should not be made to extreme as overinterpretation of attributes might result in compensation behaviour (Vandenbroele et al., 2020) or product disappointment.

**3.** An overall dietary score or 'clean label' has been suggested as a combined evaluative label or 'overall dietary quality score' for health and sustainability or naturalness, mainly encompassing the attributes organic, free from, familiar and natural (Asioli et al., 2017; Tobi et al., 2019;



**The literature points carefully towards positive effects of combining labels**
However, the limited number of studies integrating different domains and comparing ways of communication calls for caution as there seem to be for example variations between product categories, and sometimes mixed results (see Rondoni and Grasso, 2021 for a review).

## 4.3 Target specific consumer groups

**The most susceptible groups are environmentally concerned consumers, females, people with a preference for naturalness and people that already show habits to buy labelled products.**
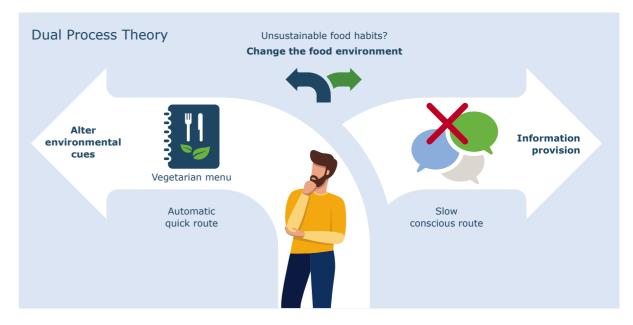
In general the various studies indicate that labelling is not equally effective for all consumer groups. In general females, concerned consumers with sustainable motivations and behaviours are most sensitive to sustainable labelling (Table 1).

| Life-style values, knowledge, beliefs | Generally, product attribute preference and corresponding buying behaviour are more guided by life-style values, knowledge (e.g. familiarity with the agricultural sector), and beliefs than by socio-demographic characteristics (Tobi et al., 2019; Vandenbroele et al., 2020; Vanhonacker and Verbeke, 2014). |
|---|---|
| Gender | As mentioned in Section 3 women are more susceptible to labelling, e.g. showing higher willingness to pay (Cecchini et al., 2018; Rondoni and Grasso, 2021; Tobi et al., 2019). |
| Environmental concern | People with higher environmental concern are willing to spend more time checking for sustainability information (Rondoni and Grasso, 2021; Vandenbroele et al., 2020). Environmentally concerned consumers could be reached with more extensive information and are supposedly the primary targets for newer and less well understood labels that still need explanation. |
| Preference for naturalness | Preference for naturalness makes consumers focus on information about omitted unsustainable ingredients (e.g. 'free from palm oil'). |
| Habits | Attitudes and willingness to pay for carbon footprint labelled products are higher when habits to buy eco-sustainable, ethical, local and organic foods are present. |

Table 1: Characteristics to target specific consumer groups

**The most promising route to target groups with strong unsustainable food habits is to alter environmental cues.**
This has been proven to work better for sustainability communication than providing information, which is processed by the slow mode of processing (Abrahamse, 2020). An effective technique tailored to the fast route is to change the food environment, e.g. by increasing the visibility of vegetarian food choices on a menu.
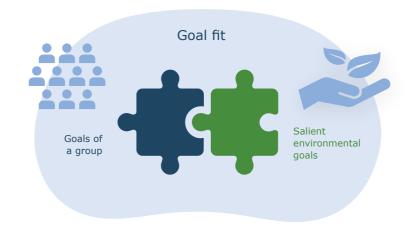


## 4.4 Increase effectiveness of labelling by means of interventions

Labelling systems mainly focus on providing information on levels of sustainability. Previous studies indicate the relevance to add behavioural interventions that focus on the motivation to make use of these labelling systems.

**Activate identification with sustainable groups**
Individuals have an urge to fit in, and to follow values of relevant groups they (want to) belong to. Considering *group identities,* it is helpful to *activate the group identity* of sustainable groups one (wants to) belong to. Alternatively, it is helpful to link climate-unfriendly behaviour to a group from which one prefers to distance oneself. In line with this, it might be helpful to fit the salient environmental goals to the goals of specific groups. For example, for conservative groups it might be good to underline the conservatory aspect of environmentally friendly products (see Vermeir et al., 2020).

**Provide sustainable social norm information on relevant peers**

Social norms and feedback are amongst the most effective factors for interventions in promoting sustainable behaviour (Vandenbroele et al., 2020). They might also be very effective in increasing the effectiveness of labelling. There are two types of social norms that have mostly been studied, descriptive norms and injunctive norms in accordance with *Regulatory Focus Theory* (Higgins, 1997). Descriptive norm messages should be rather paired with messages eliciting a promotion focus than a prevention focus, whereas the type of 'regulatory focus' is not relevant for injunctive norms (Melnyk et al., 2013). See in which cases attention should be paid with the use of both norm types in the diagram.

- *Descriptive norms:* When people score better than the provided norm, descriptive norms would not improve the behaviour further. But this can be counteracted by adding injunctive norms.
- *Injunctive norms:* Perceived threat to autonomy can trigger reactance, so they should be carefully used and best evoke thoughts about the ingroup (see Figure 6).
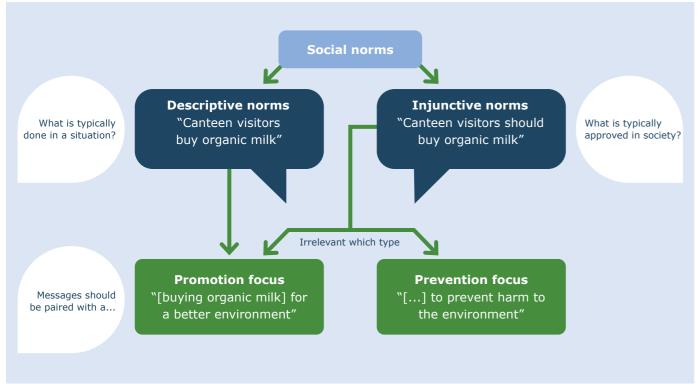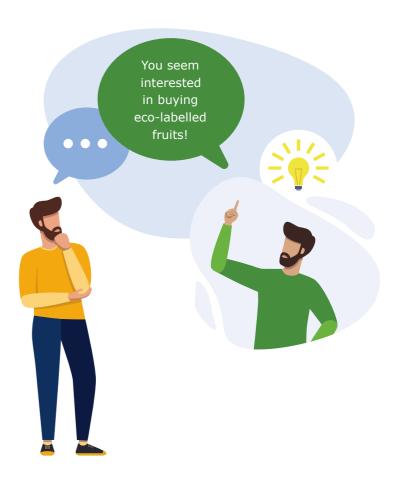


Figure 6: An illustration of descriptive and injunctive norms

**Use prompts to further increase attention**

Verbal prompts are able to catch attention and assist to steer behaviour in a favoured direction (Ebster et al., 2006). They are especially relevant in triggering underlying values or acceptance towards behaviour. Forms of verbal prompts are for example to approach customers with the assumption that they seem interested in buying eco-labelled products, questioning them whether they would buy eco-friendly or unfriendly bananas, or to frame vegetarian dishes as 'recommendation of the chef' at the moment of decision making (Vandenbroele et al., 2020).

**Make use of the affective route besides the cognitive one to support effectiveness of labelling**

**Emotional messages** are a route to support behaviour change. Changing affective feelings associated with sustainable food products can help to depict them in a more attractive way. Descriptions like 'fresh seasonal risotto primavera' instead of 'risotto primavera' can foster sales of vegetarian products. Such descriptions likely arouse positive 'anticipated emotions', meaning predictions about future experienced emotions (Bagozzi and Pieters, 1998). As people are keen to avoid negative post-decisional emotions and seek positive post-decisional emotions (Zeelenberg et al., 2000), positive anticipated emotions drive consumer decision making (Bagozzi et al., 2016). When submitting negative emotions, such as fear, regret and guilt, it is important not to be too extreme as individuals then might oppose or ignore the information. Positive emotions are generally more effective, though the hard part is that many positive qualities are associated with unsustainable behaviours, such as a BBQ. Nevertheless, acting in a climate-friendly way can also provide hope or pride which are very effective.

# 5. Conclusions

Sustainability is a difficult and abstract term for consumers. Labelling is necessary for signalling sustainability (level) of products, otherwise consumers are not aware of sustainability levels of various products and are not able to consciously choose a sustainable product over an unsustainable product. We aimed to reveal whether, and under which circumstances sustainability labelling is effective. Our systematic literature review on sustainable labelling reveals that labelling in general is shown to be effective across many studies, for example in general labelling explains 18% of consumer acceptance. However, a large amount of studies indicates the preconditions for whom and under which circumstances labelling is effective, and a range of manners to increase the effectiveness of labelling.

Regarding the preconditions, labelling is shown to be effective across many studies though especially with regard to recognition, awareness and acceptance and, to a smaller extent behaviour. Preconditions of development and communication of labelling is that label systems should be trusted, and clear. The findings carefully suggest that combined labelling systems are more effective than single labels. Moreover, sustainability labelling is especially effective for specific consumer groups. Especially informed and motivated consumers and specific age groups and females are sensitive to labelling. Indicating that vulnerable groups and groups with less sustainable consumption patterns are not reached by current labelling systems. A range of manners to increase the effectiveness of labelling is suggested:

- Increasing understandability, for all consumer groups
- Increasing familiarity with a specific labelling system
- Using target-specific communication, including motivated, mainstream, ignorant, and indifferent consumer groups
- Using supporting strategies to increase effectiveness like urgency, social norms, identity values, prompts and emotional affective support.

## 5.1 Future research should focus on ways to increase effectiveness of labelling

Taken together, the findings show the added value of labelling, though also reveals preconditions and possible manners to increase effectiveness of labelling. The most relevant research gaps mentioned throughout the various studies are the following.

- Although a large number of studies point to the added value of labelling, the findings show that these effects mainly occur on awareness and associations and have a weaker relationship with *behaviour*. Future studies could examine ways to increase the effectiveness of labelling by focusing on the paired effect of a label with added mechanisms (clear, awareness-raising, emotional, normative) on consumer behaviour. This can provide insights into opportunities to promote sustainable behavioural change in different contexts and for different consumer groups.
- The findings show preliminary indications for the added value of combined labelling systems. More different labels do not seem to result in more clarity for all consumers. A study exploring labelling systems for various *consumer groups* might reveal which labelling system is most effective for all consumer groups, or for unmotivated and vulnerable consumer groups. Moreover, traffic light systems are up-and-coming (like nutri-score and eco-score (pilot Lidl)). An interesting route would be to test the added value compared to existing labels for various groups, for example motivated, doubting and uninformed consumers. By addressing this issue, the effect of traffic light labelling systems on sustainable behaviour can be determined.
- Finally, multiple studies point at the *added value of increasing effectiveness of labelling systems.* We can for example explore the added value of social norms, emotions, and perceptions of moral obligations with existing traffic light systems like animal welfare system. Such studies could extend the findings from the current study by including and further extending upon affective drivers of consumer behaviour. This is a promising way to encourage environmentally friendly behaviour, especially among uninvolved and unmotivated consumers via already existing labelling systems.

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## Appendix A:
# Inclusion and exclusion criteria

Table 1: inclusion and exclusion criteria

| Inclusion |
|---|
| • Studies that focus on the ways in which providing sustainability information (environmental, animal or social welfare) can be effective to support consumers. |
| • Studies that focus on the effect of the mere presence of an environmental welfare, animal welfare or social welfare claim, label, or information on consumers' willingness to pay, act or attitude formation in relation to food products. |
| • Peer-reviewed papers in scientific journals |

| Exclusion |
|---|
| • Studies with a focus on informational cues denoting product attributes, other than sustainability as defined, including communication about branding, clean-label, product quality, naturalness, traceability, nutrition/health, and/or place of origin in terms of price-premium on luxury products or 'Beschermde Geografische Aanduiding (BGA)'. This also includes articles with a focus on food safety risks and food safety practices. |
| • Studies with a focus on non-related fields of research/journals such as engineering. |
| • Studies with a focus on exploring/understanding certification in the context of production, places of production or communities. |
| • Studies with no focus on consumption of food. |
| • Studies from non-Western countries. |

# Additional information on demographic variables

| | Country | Amount of articles |
|---|---|---|
| **Western Europe** | Germany<br>Belgium<br>France<br>Netherlands<br>Austria<br>Switzerland | 14<br>8<br>2<br>4<br>1<br>4 |
| **Northern Europe** | Norway<br>UK<br>Sweden | 1<br>10<br>1 |
| **Southern Europe** | Italy<br>Spain<br>Portugal | 11<br>3<br>1 |
| **Eastern Europe** | Poland | 3 |
| **Other** | Canada<br>US<br>Australia | 3<br>10<br>4 |

In terms of study design, most articles employed experimental research designs (39 studies), followed by survey research (30 articles). Only a few articles used focus groups (2 articles) or interviews (1 article). As outlined in the inclusion criteria defined for this study, the most common study population are consumers (58 articles), followed by households (5 articles) and students (5 articles).

Demographics were only included in less than half of the studies as explanatory variables (note that some studies included multiple demographics). The included demographic variables were age (9 articles), gender (8 articles), income (5 articles), and education (5 articles). A variety of different food products has been the subject of articles and is hence included in this systematic review.

# Effectiveness of labels per study

| Label | Studies showing no effect | Studies showing an effect |
|---|---|---|
| **Fair trade**<br>*(9 studies)* | *Kaczorowska, Rejman, Halcka, Szczebylo and Górska-Warsewicz (2019); Tebbe and Blanckenburg (2018); Grunert, Hieke and Wills (2014). (3 studies)* | *Schouteten, Gellynck and Slabbinck (2021); Maaya, Meulders, Surmont and Vandebroek (2018), Tebbe and Blanckenburg (2018); Lazzarini, Visschers and Siegrist (2017); Rousseau (2015); Vecchi and Annunziata (2015); Sporleder, Kayser, Friedrich and Theuvsen (2014); Grunert, Hieke and Wills (2014). (8 studies)* |
| **Organic**<br>*(12 studies)* | *De Canio and Martinelli (2021); Lazzarini, Visschers and Siegrist (2018); Kaczorowska, Rejman, Halcka, Szczebylo and Górska-Warsewicz (2019); Tebbe and Blanckenburg (2018); Rousseau (2015). (5 studies)* | *De Canio, Martinelli and Endrighi (2020), Jäger and Weber (2020); Akaichi, Glenk and Revoredo-Giha (2019); Tebbe and Blanckenburg (2018); Lazzarini, Visschers and Siegrist (2017); Sörqvist et al. (2013), Van Doorn and Verhoef (2011). (7 studies)* |
| **Carbon footprint**<br>*(6 studies)* | *Steiner, Peschel and Grebitus (2017); Meyerding (2016); Grunert, Hieke and Wills (2014). (3 studies)* | *Apostolidis and Mcleay (2019); Osman and Thornton (2019); Vecchio and Annunziata (2015); Grunert, Hieke and Wills (2014). (4 studies)* |
| **Water footprint**<br>*(1 study)* | | *Steiner, Peschel and Grebitus (2017). (1 study)* |
| **Animal welfare**<br>*(4 studies)* | *Grunert, Hieke and Wills (2014). (1 study)* | *Grunert, Hieke and Wills (2014); Cornish et al. (2020); Akaichi, Glenk and Revoredo-Giha (2019); Zakowska-Biemans and Tekień (2017). (4 studies)* |
| **Health & sustainability**<br>*(4 studies)* | | *Jacobs, Sioen, Marques and Verbeke (2018); Verain, Sijtsema, Dagevos and Antonides (2017); De Bauw et al. (2021); Lazzarini, Zimmermann, Visschers, Siegrist (2016). (4 studies)* |
| **Organic & Fair trade & carbon neutrality**<br>*(1 study)* | *Sporleder, Kayser, Friedrich and Theuvsen (2014). (1 study)* | |

# Dependent variables present in the systematic literature study

| Associations (18 studies) | Behavioural measures (50 studies) |
|---|---|
| *Attitude* | *Intention* |
| • Attitude towards sustainable product/food *(2 articles)* | • Willingness to pay/buy *(18 articles)*<br>• Purchase intention *(11 articles)*<br>• Food consumption intention *(2 articles)* |
| *Perception* | |
| • Likeness/importance/preference *(6 articles)*<br>• Perception/evaluation of product *(4 articles)* | *Behaviour* |
| *Estimation* | • Willingness to pay/buy *(18 articles)*<br>• Purchase intention *(11 articles)*<br>• Food consumption intention *(2 articles)* |
| • Product/basket impact estimation *(4 articles)*<br>• Calorie estimation *(2 articles)* | |

| Explanatory variables |
|---|
| Label/claim/certification presence *(34 articles)* |
| Presence of information *(26 articles)* |
| Presence of product attributes (not in line with definition sustainability) *(14 articles)* |
| Attitudes *(14 articles)* |
| Country/origin of product *(8 articles)* |
| Knowledge *(5 articles)* |
| Values *(5 articles)* |
| Consumer involvement *(4 articles)* |
| Motivation *(4 articles)* |
| Trust *(4 articles)* |
| Environmental concern *(3 articles)* |
| Benefits *(3 articles)* |
| Social norms *(2 articles)* |
| Beliefs *(2 articles)* |
| Habit *(2 articles)* |
| Perceived sustainability *(2 articles)* |

# Additional information about consumer groups

**Informed consumers:** Labelling seemed in general most effective for informed and well-educated consumers. In some cases, a backlash effect was reported as this specific group of consumers seemed also more critical and less trustful (Lanero et al., 2020; Van Loo et al., 2017).

**Motivated consumers:** Consumers that are already motivated (Grunert, Hieke and Wills, 2014) and mindful (Van Doorn and Verhoef, 2017) to engage in sustainable behaviours are more affected by labelling. Labelling appeals to the virtuous consumer, but efforts must be made to increase readability and comprehensibility for other consumer groups as well (Mancini et al., 2017)

**Younger and older consumers:** A considerable number of studies report on the effectiveness of labelling for young or old consumers. These findings are both mixed and inconsistent. Older consumers reportedly value and buy more organic products than their younger counterparts (Bellows, Onyango, Diamon and Hallman, 2008). Bartels and Onwezen (2014) also report that older consumers are more willing to buy sustainable or ethically labelled products. Some more recent studies show that not old but young consumers value sustainability information on food products (Sporleder et al., 2014). Finding show that young consumers have a more positive attitude towards sustainable information and are willing to pay more than older consumers for sustainable products (Sogari et al., 2015).

**Female consumers:** Women on average, compared to men, were found to attribute more value to food sustainability (Verain et al., 2017; Grunert et al., 2014; Bellows et al., 2008; Howard and Ellen, 2006). In addition, women seemed to attribute higher quality to food products that have been sustainably labelled (Van Doorn and Verhoef, 2011). Labelling has shown to be an effective tool to elicit higher willingness to pay for sustainable products amongst women (Vecchio and Annuziata, 2015), which also reflects onto higher levels of use of sustainability labels (Grunert et al., 2014) and increased choice for sustainable food (Piester et al., 2020).

## Colophon