

The effectiveness of sustainability labels in promoting sustainable food choices

A discussion of various sustainability labels formats and topics

A systematic review



Bsc thesis Bachelor Management & Consumer Studies

YSS 81812

Stefan Bos - 970509105020

Supervisor: Emily Bouwman

Chair Group: MCB Marketing & Consumer Behaviour

Wageningen University & Research

July 2019

Abstract

Background: In today's life, environmental resources are limited, while the human population keeps on growing. The earth has to provide us in the long term, so a sustainable approach to handle natural resources is needed. Sustainable food consumption can be stimulated through communication. A widely used approach to communicate with consumers is through product labels. However not all sustainability labels are interpreted the same way, with the same effectiveness. **Method:** A systematic review is conducted with literature gathered through the database Scopus. To find out what the most effective sustainability labels are, categories are made dividing labels based on format and topic. Behavioural theories (MOA model and Elaboration Likelihood model) are examined with the perspective of enhancing effectiveness. **Results:** Four types of sustainability labels were distinguished: certifications; single attribute certifications; information labels and interpretive labels. Certifications provided the most support in finding the most environmental-friendly alternative, this is based on the ease with which it is spotted. Interpretive labels are rated higher in terms of credibility, comprehensibility and overall helpfulness. Two types of label topics were distinguished: Environmental labels and ethical labels. No clear difference in effectiveness was examined. The behavioural theories show that motivation and ability are both positively influenced by the simple design of certifications, making it easy to spot the label for consumers and relatively easy to process. **Conclusion:** Sustainability labels are effective in promoting sustainable food choices. The presence of a sustainable label increases perceived quality and induces positive emotions: resulting in a higher consumers' willingness to pay. The presence of sustainability labels results in a change in consumer purchases, from conventional products to a more sustainable option, substituting the original product.

Table of contents

Abstract	2
Introduction	4
Conceptual framework	7
Methodology	9
Flowchart	11
Results	12
Certifications	13
Information labels	18
Interpretive labels	20
Discussion & conclusion	24
References	28
Appendix	34

Introduction

In today's life, environmental resources are limited, while the human population keeps on growing. The earth and its supplies cannot grow bigger to support our needs, but it has to provide us and the next generations in the long term. This asks for a wise, careful and responsible usage of the earth's resources; the need for sustainability (Bastianoni, et al., 2019). Food production and consumption both have a significant impact on the environment, contributing 20-30% of all Greenhouse Gas emissions (Vermeulen et. al., 2012). Several studies have shown that consumers have an increased interest in products that are produced in a social- and environmental-friendly way (Doane, 2001). However this does not always translate into consumers buying sustainable products. Sustainable consumption is based on the decision making process that takes the consumers' social responsibility into account, in addition to individual needs such as convenience or price (Vermeir & Verbeke, 2008). A critical point is to what extent consumers turn their expressed interest into actual purchase behaviour, as attitudes alone are found to be a poor predictor of buying behaviour (attitude-behaviour gap; Ajzen, 2001). Reasons for not following through are lack of availability, inconvenience, price, habit or trust (Robinson and Smith, 2002). Sustainable food consumption can be stimulated through raising involvement, certainty, perceived availability and social norms (Vermeir & Verbeke, 2006). All to which communication is key.

A widely used approach to communicate with consumers is through product labels. Sustainability labelling increases (environmental) knowledge, perceived availability and convenience; all which function as barriers towards *green* purchase behaviour if not experienced. Nittala (2014) suggests that the information on product labels should be reliable and provided in a simple and user-friendly way, since sustainability labelling might not have a great impact on consumer behaviour if they do not trust the information that is provided.

Sustainability labels provide consumers with information about the relative environmental quality of the product or service in a simple and user-friendly way. Besides that, labels can influence how consumers experience a product, stating that *Fair Trade* coffee tastes better than conventional coffee (Pelsmacker, 2005). This study also observes the importance of the presence of a *Fair Trade* label, with the result that this label is the second most important aspect of the coffee (after brand), leaving behind taste and price. Similar effects have been found in a range of other products, like chocolate and seafood (Rousseau, 2015; Olesen et. al. 2016)). The presence of ecolabels also seems to play a role in the willingness to pay for a food product. Rousseau and Vranken (2013) found that on average consumers were willing to pay 33 eurocents extra for a kilo of apples when they had a sustainability label attached to them. This was even increased to 57 cents per kilo when the environmental benefits were made more clear.

Over time many theoretical approaches aimed to explain *green purchase* behaviour (Joshi & Rahman, 2015). A widely used behaviour theory used in this area is the Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986). The ELM states that processing arises through either a central- or peripheral route. Under the central route, the person draws on experience and knowledge to examine the information. This happens when the person has high involvement with the topic and the ability to evaluate this information. When the person has a low level of involvement or lacks knowledge to evaluate the information, the peripheral route is used. In this route, the person's response is based on suggestions from peripheral (outer) cues: main aspects of the message that are not central to the message argument (Walters & Long, 2012). An example given in this study is the use of an Olympic athlete on the box of cereal, making consumers believe that this cereal will help them become better athletes. According to the ELM, the way consumers view and process labels

determines the degree to which particular cues receive elaboration and become encoded. Consumers who are motivated to process the details that are relevant on the label will be more sensitive to the relevancy of information about these labels (Garretson & Burton, 2005).

Next to personal factors (e.g. motivation/ intention), contextual or situational factors (e.g. availability of sustainable products in the supermarket) influence actual behaviour (Vermeir & Verbeke, 2006). The absence of these factors, or a bad practical design of such factors can be seen as barriers towards a more sustainable alternative, and a *roadblock* in the process of intentions becoming actual behaviour. The Motivation-Opportunity-Ability (MOA) model (Rothschild 1999) used two (extra) constructs that are crucial criteria to green consumer behaviour. Behaviour is not solely influenced by personal norms or beliefs, but also by external factors such as time and information constraints. The MOA model builds upon the idea of including situational conditions (opportunities) and the role of habits and task knowledge (ability), into the decision making process. Enhancing ability is realized through enhancing the ease of which a label is processed, enhancing opportunity is done through optimizing the processing route (Hallahan, 2000). This model explains sustainability choices better the popular theory of reasoned action (TRA; Ajzen & Fishbein, 1980) and the theory of planned behaviour (TPB; Ajzen, 1985), because it continues where both previous theories stopped (Padel & Foster, 2005; Joshi & Rahman, 2015).

By looking at the underlying mechanisms that play a role in the processing of information, the way a label is viewed and understood can be analysed. Not every individual processes information in the same way. Neither does an individual interpret a label in the same way over the flow of time (Elaboration Likelihood Model, Ego depletion; Bounded Awareness), or in different states of mind (e.g. mood; Pham, 2014). Abrahamse et al. (2005) show that sustainable labels should be aimed at environmental incentives rather than personal incentives, because the pro-environmental information made people feel good about themselves, and personal incentives (e.g. financial, habitual) turn into a cost-benefit scenario. Handgraaf (2018) states that financial incentives do not work in habitual behaviour, since in a cost-benefit situation the default always wins. Purchasing sustainable food products results in a social reward, highlighting the benefit for the consumer itself (Jin et. al., 2018). A social reward is described as a happy feeling (Goldstein-Piekarski & Williams, 2019), a “*warm glow*” (Handgraaf, 2018) or the feeling one gets when buying presents for loved ones (Isomura & Kano, 2017). Previous neuroscience suggested that this *social reward* activates the same reward circuitry in the brain as monetary awards do (Izuma et. al., 2008).

Knowledge has a positive influence on consumers intentions and actual behaviour of sustainable products (Eze et. al, 2013). Environmental knowledge moderates the relationship between ecological attitude (intention) and actual *green* behaviour (Fraj-Andrés et. al., 2007). Due to the positive effect on environmental knowledge on consumers sustainable purchase intentions and behaviour, an increase in knowledge can result in more actual (green) behaviour.

Another important determinant in green behaviour is trust. In the context of sustainable food choices, trust is defined as the belief about the environmental performance of the products (Chen, 2010). Trust is a major influence on green purchase intention and behaviour (Joshi & Rahman, 2015). A lack of trust in sustainability claims was a significant barrier towards the purchase behaviour of *green* products. (Tung et. al., 2012; Vermeir & Verbeke, 2008; Joshi & Rahman, 2015). Source and message credibility are also key issues in discerning what claims are legitimate and increase overall environmental knowledge of the customer (Bush, 2013).

How a pro-environmental message is framed plays an important role and is thus of major importance in the usage of a certain label, since not knowing about the way a message is received can result in

backfire (Birau & Faure, 2018). Each of the label existing in the range of sustainability labels (e.g. certifications, guidelines, traffic lights labels) is interpreted in a different way, making one type of label superior over another in context of comprehensibility, information providing or attractiveness.

Aim of this research

The aim of this research is to create a clear overview of the effectiveness of sustainability labelling in promoting sustainable food choices. This research will also distinguish types of label, and categorize each effects, benefits and disadvantages. Related to this aim, the research question of this research is:

“Are sustainability labels effective in promoting sustainable food choices?”

The research question will be answered through different sub-questions:

- **Which type of label is most effective in promoting sustainable food choices?**
- **Which label topic is most effective in promoting sustainable food choices?**
- **How can we use this information and the relationship with the MOA and ELM model, to promote sustainable food choices?**

These questions will be answered one by one. Sub question 1 (SQ1) will be answered following a conceptual framework described in the following chapter (tab. 1). SQ2 will be answered with support of the division of label topics into environmental and ethical (tab. 2).

At last, the third sub question is answered by translating the results into a method to further increase the effectiveness of the sustainability labels. The MOA and ELM models are used to examine possible enhancements. Message processing is preferred via the central route where high involvement and knowledge are present. This is in line with a high level of motivation and a decent amount of ability. It is therefore assumed that the MOA model plays a role in the effectiveness of the ELM model. The third question is answered by looking at the results of the data gathered, and how the MOA model works through these findings.




All this to answer the research question “Are sustainability labels effective in promoting sustainable food choices?”

Conceptual framework

Label category

Different type of labels work in different ways. Labels that consists of a single symbol are easier interpret than labels that consist of information tables (Borgmeier and Westenhoefer, 2009). Each individual label has its different characteristics, and depending on which characteristics a label has, a different effect on consumer choices can occur. This can therefore be a good basis for the categorization of the results. Borgmeier and Westenhoefer (2009) have examined four different types of (health) labels in their research: A “healthy” checkmark, an interpretive label, an information label and a combined information and interpretive label. These four different labels were a result of the analysis of commonly used labels on food products. The study aimed to examine which type of label would work best. The use of interpretive and informational labels is further used in various experimental studies (Roberto et. al., 2012; Watson et. al., 2014; Crockett et al., 2014).

In the research of Allison and Carter (2000), ecolabels are distinguished based on method of assignment of the label . An important distinction is made between third party certifications and self-declared certifications. Cagalj et. al. (2016) studied the effects of a self-declared (single attribute) certification compared to (third party) certifications. A combination of the theories used in the mentioned articles resulted in the making of table 1: the categorization of sustainable labels used in this review. By using this, the effects of different labels will be discussed separately and the most effective type will be examined.

Category	Explanation	Example
Certification	A <u>simple</u> (third party certified) <u>checkmark</u> indicating that a product meets certain sustainability criteria.	 i.e. Fair Trade
Single attribute certification	A label that indicates that a <u>single attribute of a product</u> meets a certain criteria.	 i.e. Recycled material
Information label	A label <u>containing information</u> about the sustainability that is linked to the product.	 i.e. Carbon footprint label

Interpretive label | A label using visual effects (e.g. colours, symbols) to indicate the level of sustainability of the product.



i.e. "Beter leven keurmerk"

Table 1: Sustainable labels categorized on type

Label topic

Sustainability as a whole strives to create value in three dimensions: People, Planet & Profit (Cavagnaro & George, 2017). These three dimensions are explained as care for you and me; - for all; - and for me, respectively. All sustainable approaches are linked to either one or multiple of the three dimensions. Fair Trade is an example of a "People dimension" label: Having the focus on fair pay-and treatment during the production cycle. The carbon footprint labels are an example of "Planet dimension" labels: Focussing on the environmental concern of production.

Grunert (2014) examined the understanding of sustainability labels in his research using four different labels: Fair Trade, Animal Welfare, Rainforest Alliance and Carbon Footprint. The first two labels deal with the ethical dimension of sustainability, the latter two with the environmental dimension, with differences expected regarding consumer awareness and understanding. According to Grunert, environmental labels show a temporal dimension, related to trade-offs between present and future. Ethical labels show the social dimension, related to trade-offs between consumer and others (see table 2). This distinction is used in various literature (Kocsis & Kuslits, 2018; Janßen & Langen, 2016).

Profit is explained as "care for me", which is elaborated as the value of the individual human life, while "People" is elaborated as the value of relationships between people (Cavagnaro & George, 2017). In terms of labels these two can be categorized under "ethical labels": showcasing the social dimension in terms of ethicality and fairness among individuals.

To accurately answer subquestion 2 "*Which label topic is most effective in promoting sustainable food choices?*", experiments will also be examined based on the topic of the label. Since both People and Profit fall under ethical, and the Planet dimension is included in environmental concern, two topics of labels are distinguished. The examined experiments will indicate whether the labels studied are of environmental or ethical nature.



Type	Explanation	Example
<i>Environmental</i>	Labels regarding the environmental dimension of sustainability: Consumer to environment (present to future)	Rainforest Alliance 
<i>Ethical</i>	Labels regarding the social dimension of sustainability: Consumer to others	Fair Trade 

Table 2: Sustainable labels categorized on topic

Methodology

In order to answer the research questions a systematic review is conducted. Relevant literature is gathered through an advanced search in the scientific search engine Scopus. Scopus is used for its advanced search possibilities as well as its reliability and use of multiple disciplinary.

The SPICE (Setting, Population, Intervention, Comparison, Evaluation; Booth, 2006) framework is used to develop specific search terms (see table 3). This review focusses on experiments that describe sustainable-, eco-, and environmental label interventions in any contextual setting and without restriction on the population studied. The interventions are evaluated with the focus on willingness to pay, consumer behaviour and purchase behaviour.

<i>SPICE elements</i>	<i>Relevant search terms</i>	<i>Justification</i>
Setting	None assigned	Interested in all contexts
Population	'Human' population	Limit to human behaviour
Intervention	Sustainability labels; Eco labels; Environmental labels; Fairtrade	Interventions of interest: Sustainability- Eco- and Environmental labels /Fairtrade labels
Comparator	None assigned	Interested in all context
Evaluation	Consumer behaviour; Purchase behaviour; Willingness to pay; intention	Outcomes of interest: Willingness to pay; Consumer behaviour

Table 3: Application of the SPICE framework

The search string used in Scopus is: TITLE-ABS-KEY ("sustainable label*" OR eco-label* OR "eco label*" OR "eco-friendly label*" OR "eco friendly label*" OR "environmental label*" OR "pro-environmental label*" OR "fair trade label*" OR "interpretive label*" OR "information label*" OR "sustainable claim*" OR eco-claim* OR "eco claim*" OR "eco-friendly claim*" OR "eco friendly claim*" OR "environmental claim*" OR "pro-environmental claim*" OR "fair trade claim*" OR "interpretive claim*" OR "information claim*") AND TITLE-ABS-KEY (food) AND TITLE-ABS-KEY (consumption OR "food choice" OR purchase OR "willingness to pay" OR intention) AND PUBYEAR > 1999

In this search string all variations of sustainable label definitions used in research papers are included. Specific outcomes are also indicated in this string. Literature from before 2000 will be excluded to guarantee that the information used is relevant and applicable to life in the 21st century. The search string is not limited by factors, such as future releases or domain restrictions to ensure that all relevant studies are found. The total amount of studies generated with this search string was 142 on June 10th.

As a second method for the retrieval and gathering of relevant literature, the Snowball Method is used (reference). This is done to increase the data pool with relevant studies. In total 2 studies were found through the Snowball Method, that were not already found with the first method. The reason for two studies for not being included in the initial data gathering is that these articles put the focus

on carbon labelling, and did not mention any of the type of label that was present in the search string of this review (Feucht & Zander, 2016; Emberger-Klein & Menrad, 2017).

Inclusion criteria	Exclusion criteria
Articles about consumer behaviour/intentions in regards to sustainable labelling	Articles with a focus on nutrition label
Consumer research with a focus on food consumption in regards to sustainable labelling	Articles with a focus on health related risks and dangers.
Articles containing information about purchase behaviour regarding sustainable labels	Articles with a focus on food safety.
Articles containing information about the willingness to pay in regards to sustainable labelling	Systematic reviews / literature studies
Articles that implemented an experiment	

Table 4: Inclusion and Exclusion criteria

A set of inclusion and exclusion criteria was created to bring structure to the screening process. Based on these inclusion and exclusion criteria, titles are read, followed by abstracts. Table 4 shows the inclusion and exclusion criteria on which titles and abstracts are judged.

Based on these criteria a list of 82 articles is generated. The list of 82 articles is then screened in order to find experiments that are suited for this review (e.g. excluding literature studies and reviews). After this second screening a list of 28 experiments is used. This is done after the initial screening, and manually to remain the least of bias and less possibility to exclude important research. The full-text of these 28 studies was screened and eventually 16 studies from Scopus were used in this research (June 16th). Important reason for twelve studies to be distracted from the literature pool were lack of (level of) evidence, lack of desired outcome measures and low number of participants (lack of credibility). Some articles with a low respondent number were however included, this is due to the desired heterogeneity of the results and thus the need for a range of study designs. Two studies were generated through the Snowball method, setting the total of experiments on 18 (June 21st). A flowchart of this process is shown in figure 1.

Quality assessment

All articles included in this review were assigned to a level of evidence as specified by the Australian National Health and Medical Research Council (National Health and Medical Research Council, 1999; as indicated by Wilson et. al., 2016) (See Tab A.1.) The level of evidence is based on study design, to showcase the overall credibility of the study and the extent to which the results of each study could be trusted. The levels range from I to IV, with I being the most qualified. The results of the quality assessment are shown in table 5-8.

Flowchart

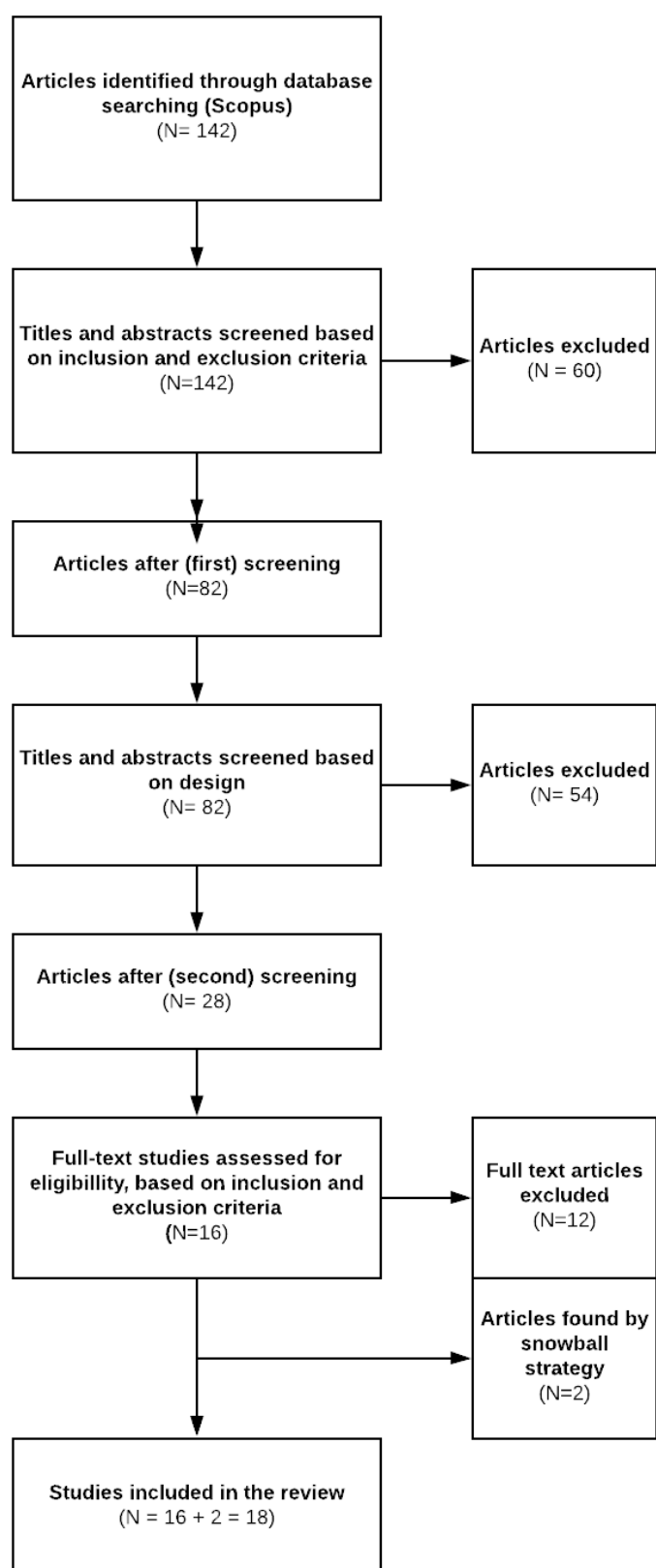


Figure 1: Flowchart of article screening and selection

Results

Eighteen articles were extensively examined in order to create an overview of the effectiveness of sustainability labelling on the promotion of sustainable food choices. Summaries of the studies are included in tables 5-8. Beforehand the studies were divided into four groups; Certifications, single attribute certifications, information providing labels and interpretive labels. There were however no studies that studied the effect of a single attribute certification.

Nine out of eighteen studies have been conducted through a choice experiment (discrete or market). A choice experiment is often used to provoke consumer preferences for sustainability labels, and is considered the best method to examine willingness to pay (WTP) (Maaya, 2018). Choice experiments in this review all work on the random utility theory, which let consumers indicate which option maximises their utility. This is based on the assumption that consumers all maximise their utility (Hanley, 1998). The other eight studies consist of one experimental auction, three questionnaires, one human experiment and four (framed) field experiments.

Topic-wise, the majority of labels focus on the environmental dimension of sustainability with a total of thirteen studies. Five studies take the ethical dimension of sustainability in account (one with focus on ethical).

A substantial degree of heterogeneity was visible across all studies related to the interventions, populations and settings that were studied, as well as the outcomes reported.

Certifications

Eleven of the included studies were studying the effectiveness of certifications (table 5). The level of evidence of these articles ranges from lowest to the second highest level. The designs used are choice experiments (8), questionnaires (2), a human experiment (1) and an experimental auction (1).

Outcome measure and effect

In total eight studies measured willingness to pay. These eight studies show a positive effect on the willingness to pay (WTP) when a product contains a sustainability label (both environmental and ethical). Coffee products had an increase in WTP of €2,10 for a Fair Trade label and €2,20 for an organic label compared to a conventional alternative (Maaya et. al., 2018). This price premium is increased with up to €0,50 when the consumer has a university degree.

The presence of a Fair Trade label resulted in a price increase from on average 10% in the study of De Pelsmacker et. al., (2005). This increase is up to 36% in the consumer segment "*Fair Trade lovers*" which consisted of 11% of the respondents. This group showed a high and clear preference for fair-trade labelled products. Next cluster were the "*Fair Trade likes*", with a total of 40% showed a relative balance in importance of attributes, but still with Fair Trade label rated as important. The next two clusters were *Brand-* and *Flavor lovers*, indication brand and flavour as most important, respectively. Fair Trade lovers and Fair Trade likers made up for the majority (51%) of the group; both willing to pay the price premium for Fair Trade products.

In the study of Liu et. al., (2017) there were three clusters made; *Eco-label preferred*, *price sensitive* and *geographical origin orientated*. The majority (52,3%) belonged in the first cluster, willing to pay a price premium of approximately €1,- (¥7,784) per 500 grams for organic labels. The second cluster showed the lowest WTP for organic labels, having price as most important attribute. Still the second cluster was willing to pay approximately €0,14 (¥1.061) per 500 grams more for an organic label.

In the study of Olesen et. al., (2010) different labelled salmon was offered to the respondents. An increase of €2.00 per kilo of labelled salmon was found. An important attribute in the purchase of salmon was colour. Sustainability labelled salmon was only granted a higher willingness to pay if the colour was as bright/ brighter than the conventional salmon.

In the area fruit and vegetables an increase of 42% was found for organic apples compared to conventional, non-labelled apples. For organic labelled tomatoes this increase was 59% (Cagalj et. al., 2016). This study combined certifications and information labels and as a result showed that the inclusion of more information (environmental, health related, or taste related) increased the WTP. Information beforehand about the labels, alongside an organic certification increased the WTP with 16-20%, compared to 12% in health claims, and a nonsignificant increase in taste claims. The increase of WTP after inclusion of information is also shown in the study of Lombardi et. al (2017).

A study by Rousseau (2015) studying chocolate, found an increase of €2,03 for the inclusion of a Fair Trade label, and the inclusion of an organic label resulted in the decrease of €0,37. Chocolate is dominated by taste and price.

Underlying mechanisms & consumers' opinion

Consumer attitude towards sustainability is an important indicator of which type of label is effective in promoting sustainable food choices. In the study of De Pelsmacker et. al (2005) Fair Trade labels come in second, again, this time right after brand of most important attribute.

Pro-environmental labelled food induces more positive emotions (Jin et. al., 2018). This is consolidated by the observations that pro-environmental labelled food reduces cognitive conflict inside the decision making process. This cognitive conflict is caused by the social desirability of consumers to fulfil social expectations, that encourage *green* behaviour (Jin et. al., 2018). A positive feeling towards certain marketing stimuli is positively related with behavioural intentions making a sustainability label attached to a product result in higher purchase intentions (Jin et. al., 2018; Olesen et. al., 2010).

In context of perceived utility, adding an environmental label to products increased the utility more than changing from an international, to a national brand and even to a local brand (Liu et. al., 2017). Consumers that have great food safety concerns and environmental concerns are more prone towards sustainability labelled products. An environmental and altruistic attitude has an important role in driving consumers decisions and intentions to sustainable products (Maaya et. al., 2018)

In China, food safety is the main reason for the importance of sustainability labels (Tait et. al., 2016). This is due to the *ease of recall*: China has had many incidents showing a poor food safety record. Further it is assumed that consumers perceive organic labels as a healthy option, this is an indicator why organic certifications on chocolate do not increase willingness to pay (Rousseau, 2015).

When asked beforehand, 30% of all respondents found Fair Trade labelling a mere marketing tool; 40% found that of organic labels. However 22% percent of all respondents believes that all Fair Trade labelled products guarantee a sustainable production; 16% believes that of organic labels (Rousseau, 2015). When exposed to information beforehand, the environmental attributes ranks higher in the decision making process (Lombardi et. al., 2017): the carbon-free certification was not of high importance in the first experiment, but after explanation of the label, the label's importance increased in the consumer's selection process. A lack of clarity is credited as an important source for individuals to not follow through with their *green* purchase intentions (Maaya et. al., 2018).

One tick labels (a type of certifications used in the study of Emberger & Menrad, 2018) provided the most support in finding the most environmental-friendly alternative (Emberger & Menrad, 2018). Information beforehand helped. A (well-known) third party certified certification, however, is rated higher in terms of credibility.

Sustainability certifications have a perceived effect of decreasing total environmental impact (Gorissen & Weijters, 2016). Adding an organic labelled product to a basket mitigated the perceived impact of the conventional products (negative footprint). The negative footprint is a function of the presence of an organic label and not of the characteristics of the item. This problem is in related to the known bias called conjunction fallacy, in which people violate the rule of probability of a conjunction: the change of $P(A \& B)$ cannot be higher than the probabilities of its parts $P(A)$ and $P(B)$ (Gorissen & Weijters, 2016).

The role of motivation, ability and opportunity

The greatest influences on the motivation *pillar* of the MOA model found in this area, are social desirability, the inducement of positive emotions and the ease of recall. These are three determinants that should be in the spotlight when looking at influencing consumers motivation. Next

to these drivers, an environmental and altruistic attitude is connected to higher level of motivation (Maaya, et. al., 2018). In terms of ability, the cognitive conflict found in the theory of Jin et. al. (2018) is a great example of a barrier in the information processing. This was in the study battled through the positive emotions and acceptance through social desirability, increasing consumers ability to process the information displayed. Information beforehand has proved to be the best way to optimize information processing, in response being an affluent attribute towards promoting the opportunity *pillar* of the MOA model.

Label Topic

Food safety and animal welfare labels were indicated as having the highest WTP (Tait et. al., 2016). Organic (environmental) labels were second to highest important attribute (0.21), closely followed by Fair Trade (ethical) labels (0.20). Only price was perceived of higher importance (0.36) (Maaya et. al., 2018). However the results of this study imply that consumers who are willing to pay a price premium for fair trade coffee, were also willing to pay a similar price premium for organic coffee and vice versa.

Looking at studies that directly compared environmental and ethical labels, it is visible that environmental labels hold a higher effect than ethical labels (Maaya et. al., 2018; Olesen et. al., 2010) For chocolate this is the other way around (Rousseau, 2015).

<i><u>Author</u></i>	<i><u>Experiment</u></i>	<i><u>Intervention</u></i>	<i><u>Results</u></i>	<i><u>Label topic</u></i>
<i><u>Maaya et. al. (2018)</u></i>	Discrete choice experiment (N=262) LE: II	Discrete choice experiment with five options (four coffees and an opt-out). 6 attributes (taste, production, origin, Fairtrade, organic, price), 12 distinct choice sets. Choice sets were separated into two blocks, participants randomly assigned.	WTP for Fairtrade +2.10 WTP for organic +2.20. Most important attribute: Price (0.36) Organic (0,21) Fair trade (0.20), Origin lowest (0.05) Higher university education: WTP + 0.50. Correlation between fair trade and organic 0.9.	Ethical/ Environmental
<i><u>Jin et. al. (2018)</u></i>	Human experiment (N=21) LE: III 2	Analysis of visual stimuli when confronted with eco-labelled food versus non-eco-labelled food. Participants rated purchase intention of pictured product (with label)	Greater willingness to buy eco-labelled food. Eco labelled food induces more positive emotions. Purchase intentions of eco-labelled is higher. Non labelled food involves cognitive conflict.	Environmental
<i><u>Lombardi et. al. (2017)</u></i>	Choice experiments (N= 39) LE: III 3	Presence of carbon-free and organic labels in products with ranging prices. Choice experiment with three attributes (carbon free, organic and prize). At two levels (yes/no, yes/no, 0.84/1.64 resp.). Respondent chooses preferred product.	Consumers perceive higher utility in organic than in carbon free. Carbon free has higher purchasing power and WTP (0.55 over 0.51). After information, WTP of organic labels grew to 0.56. Substitution effects between both labels (competitive effect).	Environmental
<i><u>Liu et. al. (2017)</u></i>	Choice experiments (N=435) LE: III 3	Mixed logit model. Four attributes (brand, eco label, origin and prize). 18 options separated in two groups of nine and participants randomly allocated. Three options (Option A, B or neither).	Increase of utility when choosing A or B. Eco labels had greatest increase, followed by origin, national brand and local brand. 52,3% has highest WTP for ecolabel attribute (eco label preferred group).	Environmental
<i><u>Rousseau (2015)</u></i>	Discrete choice experiment (N=601) LE: III 3	Presence of environmental labels on chocolate and it's characteristics (i.e. prize, taste) Attributes (taste, fair trade, country of production, organic, price). Sixteen different varieties constructed in eight different choice sets. (A, B or opt out).	30% find fair trade a mere marketing tool (40% organic). 16% indicate that all types of organic labels guarantee a sustainable production (22% for fair trade). Fair trade WTP (+2.03). Organic WTP (-0,37).	Ethical/ Environmental
<i><u>Olesen et. al. (2010)</u></i>	Market choice experiment (N=115) LE: III 3	Thirty choice scenarios with two alternative salmon packages and an opt-out option (conventional, organic, animal welfare) Mimics shopping situation. Real economic incentives.	Preference labelled over conventional. WTP of 2,- per kilo. Inferior appearance products will not likely achieve this success.	Ethical / Environmental
<i><u>de Pelsmacker et. al. (2005)</u></i>	Questionnaire (N=808) LE: IV	Survey, conjoint analysis attributes preference on coffee (Brand, Blending, Flavour, Package and label) With this 8 products profiles were visualized.	Fairtrade label comes second in purchasing decision (after brand). Average WTP for fair trade label 10% Grouped: Fair trade lovers (11%) pay +36%	Ethical
<i><u>Tait et. al. (2016)</u></i>	Choice experiment & Cross country comparison	Consumers indicate their preferred alternative lamb product, attributes: (animal welfare, food safety, country of origin and price)	Food safety and animal welfare highest WTP for all certifications. GHG minimization highest of all environmental labels.	Ethical/ Environmental

<u>Gorissen & Weijters (2016)</u>	(N= 3 x 100 = 300) LE: III 3			
	Online survey (N= 536; 580; 219; 417) LE: II	1)) Randomly assigned to one of three conditions (main meal, main meal + organic side, main meal + non organic side). Respondents had to indicate the environmental impact of their list. 2)) Repeat with (evaluative vs quantitative scale) 3)) (main meal, main meal + organic labelled dessert, main meal + non labelled dessert). 4)) Evaluate environmental impact of eight random meals	1)) Respondents who are more concerned rate their list higher. Organic option decreases perceived impact. 2)) Environmental impact is higher when confronted with evaluative scale. 3)) adding organic label decreased perceived impact. 4)) no negative footprint	Environmental

Note. LE = level of evidence

Table 5: Overview of experiments regarding certifications

Information labels

A total of five studies have been done on the effects of information providing labels (three solely on information; two on information & interpretive labels). The level of evidence of these articles ranges from lowest to second degree. The designs used are (framed) field experiments (3), a choice experiment (1) and a questionnaire (1).

Outcome measures and effect

Adding an informational label on top of a certification increases the total price premium with an average of 30% (Bernard et. al., 2019). In this framed field experiment a non-information containing label is added to a watermelon, indicating an increase of €1.82 WTP. By adding an information providing label, the WTP rises with €2.42 (€0.60 more). Information labels distinguish the product among (organic) competitors, increasing the WTP with €0.39 on farmers markets (where only organic products are sold) (Bernard et. al., 2019).

The WTP for locally produced food, indicated on the information label, is higher than that of further away produced food (100KM, 800KM or 2000KM) (De-Magistris & Gracia 2016). In this study, three clusters were created: *Conventional consumers*, *short distance consumers* and *sustainable consumers* (respectively 31%, 36% and 33%). Conventional consumers hold a positive willingness to pay to organic labels, as well as to locally produced (short distance) labels. Respondents were willing to pay a price premium of €0,27 per 100 grams of organic labelled almonds and €0,21 per 100 gram for local produced almonds. The 800KM and 2000KM labels hold no increase in WTP, with the 2000KM label resulting in a negative WTP. The second cluster preferred local production and was willing to pay €1.18 per 100 grams more for locally produced. The consumers in this cluster showed a price premium of €0.85 for organic labels. The third segment had an average WTP of €1.40 more per 100 grams for local produced almonds, and €1,22 more per 100 grams of organic labelled almonds. Same as the first group, the WTP for the 2000KM produced almonds was €1,33, indicating that consumers in the first and third group would want to pay €1,33 less for further away produced almonds (De-Magistris & Garcia, 2016).

Providing information in form of labelling enhances the effect of (self-declared) single attribute certifications (Ertz et. al., 2017). Single attribute certifications alone do not alter consumers evaluations and their WTP.

Underlying mechanisms & consumers' opinion

Upon presence of the information label, perceived taste and food safety increase (Bernard et. al., 2019). Taste increased from 2.9 to a 4.5 (on a five point scale) when provided with an information label. Perceived food safety increased from 2.8 to a 4.5 when providing an information label on the product. Information labels enhance perceived quality and food safety (Ertz et. al., 2017).

Information providing sustainability labelling is associated with independence, fairness, precision, honesty or transparency. This positive effect echoes on to the self-declared single attribute certifications. This effect will be even stronger if those single attribute certifications are combined with information. Ertz et. al., (2017) uses this information to explain the gap between the positive consumer attitude towards sustainability labelled food products, and the lack of actual sustainable behaviour. With no information and no elaboration of the displayed labels, the actual willingness to buy is not triggered, so there will be no follow-through of the positive attitude. Without information, there is no credibility and no perceived quality increase for consumers.

Consumers utility is higher when information labels indicate a locally produced product: Utility in the 100KM label was higher than in the 800 or 2000KM label (De-Magistris & Gracia). Consumers hold a positive attitude towards locally produced products (indicated on the information label) and a negative attitude towards products that are produced further away (De-Magistris & Gracia 2016).

The positive effect of sustainability labelling is present in both information as interpretive labels (Muller et. al., 2019). The presence of either one results in a higher willingness to buy (intention). However multiple traffic light labels (interpretive labels) are rated superior. Information labels resulted in the most comparison, stating that due to Kilometric labels more products were put back and substituted for alternatives with a lower environment-harming *score*. This happened with more products, but fewer times (Muller et. al., 2019). Consumers act in accordance with normative signals: this puts a simple, colour coded label over a more informative one. Consumers tend to feel reluctant to go through effort in order to make use of given information, if this is not necessary.

Consumers prefer information on environmental impact at the attribute level of the product, and the interpretive score at the product level. It is shown that the increase of eco-friendly products was at the expense of lower scoring environmental-friendly products (Vlaeminck et. al., 2014).

The role of motivation, ability and opportunity

Information providing labels hold multiple positive associations held by consumers. The association of independence and transparency result in higher perceived value and thus higher motivation. Taste and quality were perceived higher, positively influencing motivation (Ertz et. al., 2017). Ability is less affected by information labels: consumers tend to be more capable of reading simple and colour coded labels. The effort that is associated with processing information labels is not optimal. Information labels maintain the same effect as certifications on the opportunity part of the MOA model, information providing resulted in better processing.

Label topic

No ethical labels were examined in the experiments regarding information providing labels.

Interpretive labels

A total of four experiments were performed on the effects of interpretive labels (two solely on interpretive labels, two on information & interpretive labels). The level of evidence of these articles ranges from the lowest degree to the second degree. The designs used are (framed) field experiments (3) and a choice experiment (1).

Outcome measures and effect

Consumers are willing to pay up to 20% more for products that have a climate friendly (interpretive) label. Consumers are willing to pay the highest price premium for presence of the CO2_A label (an A rank regarding carbon label), followed by CO2_B (B rank carbon label). The price premium ranged from +7% in Norway to +20% in Italy (Feucht & Zander, 2018). However local produced labelled product are receiving a higher WTP than carbon labelled products.

When placing various coloured labels on a range of products in a supermarket (black, yellow, green), the sale of the green labelled products increased from 53 to 57%, the black (indicating a bad environmental option) decreased in sales from 32% to 26% (Vanclay et. al., 2011).

Underlying mechanisms & consumers' opinion

With the presence of interpretive labels it is again shown that consumers prefer sustainable labelled products over conventional products, with a higher purchase probability due to the sustainability label (Feucht & Zander, 2018). Consumers are very sensitive towards interpretive labels, especially ones that indicate a sustainable option. Green water bottles were even depleted due to an impossible high demand (Vanclay et. al., 2011).

Consumers prefer a horizontal scale in traffic light colours, indicating a good or bad product (Feucht & Zander, 2018). The majority of the respondents was willing to buy climate friendly products (60%), but expect policy makers and retailers to set up appropriate structures to support sustainable consumption. Without this structural support, interpretive carbon labels is limited.

Consumers tend to put all interpretive sustainable labels (e.g. local –or organic production) under the umbrella-term *Eco-friendly* or *Ethical behaviour*. Preferences are however not always translated into purchasing behaviour, a lack of information is to blame for this (Feucht & Zander, 2018).

Consumers dislike labels that provide them with raw information and prefer labels that combine information with an overall (interpretive) score (Vlaeminck et. al., 2014). Combined informational and interpretive labels resulted in an increase of the environmental score of 5,3% of all food consumption. Easy-to-interpret environmental information providing food labels lead to more eco-friendly consumption in every food category. The extent to which switching behaviour is shown depends on the characteristics of each products.

In terms of comprehensibility, credibility and overall helpfulness, the interpretive label is rated the highest, beating certifications (Emberger & Menrad, 2018).

The role of motivation, ability and opportunity

Consumers motivation is highly affected through colours. A major increase in consumer demand through adding green indicators on water bottles shows this effect (Vanclay et. al., 2011). Ability is positively affected by the perceived comprehensibility and credibility interpretive labels hold towards

consumers. Ability is also influenced by the colours, resulting in an easy processing of information: that what information labels lack. Structural support and information provided about the way interpretive labels work is a major factor in influencing consumers opportunity. Without the presence of both, the processing of interpretive labels is low.

Label topic

No ethical labels were examined in the experiments regarding information providing labels.

<i>Author</i>	<i>Experiment</i>	<i>Intervention</i>	<i>Results</i>	<i>Label topic</i>
<i><u>Bernard et. al. (2019)</u></i>	Non-hypnotical field experiments (N= 328) Level of Evidence (LE): III 2	Presence of information-containing labels or non-informational labels on watermelons Using real money and watermelons in a park (public area) and a farmers market simultaneously (Random sample and informed sample) Auction where WTP was measured + survey where perception was measured Exploratory factor analysis to measure perception	Perception: no-info label increased “localness” also when added to information label. Taste and safety increased WTP: No info label +1,82; Both + 0,60 In the farmers market +0,39	Environmental
<i><u>De-Magistris & Gracia (2016)</u></i>	Choice experiments (N=171) LE: III 3	Presence of various information labels on almonds Attributes altered 1) Prize (0,49 cent intervals 2) Distance (no info, 100, 800 and 2000KM) 3) Method of production (no info or organic)	Utility in organic label is higher; Utility in 100KM is higher than 2000; Positive towards 100 km, indifferent towards 800 and negative towards 2000; Utility in locally and organic is high WTP for locally: 1.18; WTP for Eu organic: 0.85	Environmental
<i><u>Ertz et. al. (2017)</u></i>	Questionnaire (N=321) LE: IV	Self-declared environmental claims (succinct vs. elaborated) and environmental information Randomly assigned to one out of four conditions (no info + no label), (info + no label), (no info + label) and (info + label).	Environmental labels enhance quality and credibility (of self-declared) but not WTP. Single attribute labelling alone does not alter consumers evaluations and their WTP: self-declared environmental claims should be complemented by environmental information	Environmental

Table 6: Overview of experiments regarding information providing labels

<i>Author</i>	<i>Experiment</i>	<i>Intervention</i>	<i>Results</i>	<i>Label topic</i>
<i><u>Feucht & Zander (2018)</u></i>	Choice experiment (N= 6007) LE: III 3	Quantitative online choice experiment to measure preferences of coloured interpretive labels carbon labels on milk Then interview for the underlying reasoning. Attitudes towards labels were assessed by the degree of comprehensibility and the indicated trust in the labels.	Climate friendly milk was preferred over non labelled milk. Organic milk was preferred over non labelled milk. WTP increases with 20%. Purchase probability increased due to label. In Germany, Norway and UK the carbon label was preferred over de organic label. Interviews: consumers value climate friendly labelled food but the preferences are not translated into purchasing behaviour. Only want more info when needed it. In form of advice	Environmental
<i><u>Vanclay et. al. (2011)</u></i>	Field experiment (N= not specified) LE: IV	Placement of interpretive carbon footprint labels on food packages in grocery stores. During 12-week period, 2890 labelled products were sold.	Green labelled water bottles depleted due to too high demand. Green labelled products increased from 53% to 57%; Black labelled decreased from 32% to 26%.	Environmental

Table 7: Overview of experiments regarding interpretive labels

<u>Author</u>	<u>Experiment</u>	<u>Intervention</u>	<u>Results</u>	<u>Label topic</u>
<u>Muller et. al. (2019)</u>	<u>Interpretive vs. Information</u> Framed-field Experiment (N= 275) LE: II	Presence of single traffic light labels, multiple traffic light labels and kilometric labels on multiple food products Grocery shopping in experimental store (no purchase needed/ no budget constraint) Part 1 = reference basket (no labels included) Part 2= all products are labelled = label basket - Control group had no labels in part 2	Descriptive result: consumers choose foods that are more environmental friendly than the average food available. Every form of environmental labelling has a positive effect on the environmental quality of the basket. mTL generate larger GHG decrease than KM. mTL is superior in every product category. KM provides the most item replacement to reduce GHG, but replace fewer items.	Environmental
<u>Vlaeminck et. al. (2014)</u>	<u>Interpretive vs. Information</u> Framed-field Experiment (N= 150) LE: III 1	Customers rating of six alternative labels in terms of accessibility of the environmental info and impact Perceived most effective label (Treatment Most) and least effective (Treatment Least) to control the pure label effect. Environmental impact is presented on the label in six different ways, ranging from raw information at the attribute level, standardized colour scale attribute level to standardized score at the product level. To allow interaction effect, some labels are combined into a new label.	Consumers prefer the label that combines information on environmental impact at attribute level with the overall environmental score at the product level (5). The label with raw information the least (2). Increase of more eco-friendly products was as a substitution of the least eco-friendly products.	Environmental
<u>Cagalj et. al. (2016)</u>	<u>Certification vs. information</u> Experimental auction (N= 258) LE: III 2	Participants bid for real food products (organic and conventional) with real money Round one no label. Round 2: certification. Round 3: detailed info (Environmental, Health and Taste claims).	WTP +42% for apples and +59% for tomatoes (organic). WTP increases with 16-20% for environmental certifications compared to 12% in health claims.	Environmental
<u>Emberger & Menrad (2018)</u>	<u>Certification vs. interpretive</u> Discrete choice experiment (N=379; 413) LE: III 3	Three different carbon labels were tested. Scale labels, Blue Angel label and one-thick label. Participants had to choose preferred label in terms of comprehensibility, credibility, provision of information and helpfulness. Discrete choice experiment: Eight times choice between three tomatoes and opt out. Six times between three apples and opt out.	One tick label provided most support in choosing the eco-friendly alternative. Scale the least. Information beforehand helped. Scale label rated most comprehensive and most information providing. Blue Angel as most credible.	Environmental

Table 8: Overview of experiments regarding combinations of label formats

Discussion & conclusion

The aim of this systematic review was to investigate the effectiveness of different type of sustainability labels in promoting sustainable food choices, categorized by type and by topic. Answers to the sub-questions are given here. These answers are exclusively based on the eighteen studies examined in this review. The questions will be gone through one by one.

Conclusion sub-question 1

Sub-question one is about the categorisation of the sustainability labels, based on characteristics. This review distinguished four types of sustainability labels: certifications; single attribute certifications; information labels and interpretive labels. Certifications provided the most support in finding the most environmental-friendly alternative, this is based on the ease with which it is spotted. Interpretive labels are rated higher in terms of credibility, comprehensibility and overall helpfulness. Since single attribute are stated to have a limited effect without the use of information labels, this type is rated least effective. When comparing information providing labels with interpretive labels, the latter is rated higher, which puts interpretive labels and certifications on the top of being most effective in promoting sustainable food choices. Consumers prefer information beforehand in the form of advice, and not put on the product as a label, since this can make it complicated.

Interpretive labels are rated high based on their overall helpfulness and their user friendly design. Certifications are rated high because of their ease and credibility. It looks like both label formats work better in different situations. Interpretive sustainability labels are not that common in real world products, consumers thus have not had the time to gain experience with them, hence evidence of its effectiveness is limited. An increase in recent experiments in the use of interpretive labels is seen. A concrete conclusion of which label format is the best is thus not yet plausible.

In the research on which the conceptual framework is designed (Borgmeier and Westenhoefer, 2009), interpretive traffic light labels were rated as most preferred. This conclusion is also found in the systematic review of nutrition labels of Cecchini & Warin (2016). However, only one in four shoppers actually looks for nutrition information on food packages in supermarkets (Borgmeier and Westenhoefer, 2009) it then assumed that consumers tend to look more into labels when asked to rate them. Then again, interpretive labels in the sustainability dimension are not yet familiar in everyday shopping life.

The effectiveness of certifications is also found in the literature of the MOA model (Hallahan, 2000). The use of logos, symbols and marks provide valuable information, if the source is perceived credible. Certifications provide valuable signs that help to access extant memory structures, which are the foundation of branding and integrated marketing campaigns (Brosius & Bathelt, 1994).

Conclusion sub-question 2

Sub-question number two is about which label topic is most effective in promoting sustainable food choices. This is examined by looking at the distinction made in table 2, namely: Environmental and Ethical labels. The first finding in this that organic certifications are not effective in increasing the willingness to pay of chocolate products, even resulting in a decrease in willingness to pay. It is assumed that this is because organic labels are perceived as healthy attributes, and chocolate is perceived as an unhealthy product, so there is a mitigation of the effect. If Rousseau's (2015) assumption is correct, this places a disadvantage on the environmental labels of all *unhealthy* food

products. However a clear plus is seen in the effects of environmental labels (resulting in higher WTP and more important perception), often compared to ethical labels.

No clear conclusion is found in the difference in WTP for ethical or environmental labels, this is in line with the work of Loureiro & Lotade (2005) and Annunziata et. al. (2011). Reasons for this are that labels often show overlap in their objectives (Reinecke et. al., 2012) and that an increasing number of food products have sought to satisfy more than one sustainable requirement (Giovannucci et. al., 2010).

Conclusion sub-question 3

It is shown that sustainability labels work best if information is provided beforehand, directly influencing central route processing by increasing knowledge. Consumers have a preference for easy and user friendly labels, colourful if possible. It is shown that consumers prefer a combination of both information and interpretive labels when ranking comprehensibility and helpfulness. Information (in the form of advice) beforehand is stated as a *boost* in all outcomes, ranging from willingness to pay to perceived credibility, applicable in all four of the different label types (certification, single attribute, information label, interpretive label).

Motivation and ability are both positively influenced by the simple design of certifications, making it easy to spot the label for consumers and relatively easy to process. This is combined with consumers' reluctance for information provided on the package. Interpretive designs are perceived more attractive and thus creating a higher motivation level. This high motivation level influences central route processing and so higher involvement with the goal of the label. This is important to look at in the production process of a new sustainability label.

Consumers have also stated that they feel partly responsible for the need for sustainability. Consumers specify how policy makers and retailers should do their part in the promoting of sustainable food options, and enhancing the overall ease at which sustainable food choices can be made. It can be advantageous for retailers to improve their commitment to the sustainable movement, to show customers that their perceived individual effectiveness is of importance.

MOA for enhancing message processing

Further research is done for the enhancement of the motivation, ability and opportunity. A variety of techniques could be used to enhance consumers' motivation. The motivation part in terms of message processing is focused on the attraction and encouragement of consumers to the label. Hedonistic needs, such as appetite and safety, prove to have greater effect on consumer attention. (Holbrook & Hirschman, 1982) Greater message affect is also created by the use of visuals and colors, as well as different format size, preferable oversized (McQuarrie & Mick, 1996; Homer, 1995). It is assumed that a high motivation leads to processing through the central route, according to the ELM.

Ability is focused on making the message easy to process for consumers. It is shown in this review that consumers prefer simple, clear and easy to use sustainability labels, this is in line with the research Hallahan (2000), which states that simple and clear messages work for a quick and easy processing. Graphics enhances recognition, decrease time spent on processing and result in more consistent attitudes (Edell & Staelin, 1983).

Enhancing the opportunity part of the MOA model is about the optimization of the processing. One clear advice that is given is to avoid distraction, for example by the presence of too many labels

(Hallahan, 2000; Thøgersen, 2005). This is also proven in the study of Bush et. al. (2013), where multiple labels were rejected due to the complexity and the mitigating effect.

All of this can be used as a starting point to create new labels in the future, or change existing labels in order to show a stronger promoting effect. Thus answering the question, how can we use this information (...) to promote sustainable food choices? Again, it is assumed that a high motivation results in a tendency for information to go through the central route (in the ELM model).

Conclusion

Sustainability labels are effective in promoting sustainable food choices. The presence of a sustainable label not only increased willingness to pay, perceived quality and positive emotions. The presence of sustainability labels also resulted in a change in consumer purchases, from conventional products to a more sustainable option, substituting the original product. The results show a favourable attitude towards certifications and interpretive labels, leaving information labels and single attributes behind. The results in consumer attitude suggest that consumers hold a high value towards information beforehand, and claim that credibility is of high importance.

These results are in accordance to the research of Chen et. al., (2010): stating that consumers with more knowledge about label-related issues have a higher willingness to pay and higher buying intentions. In the research of Ricci et. al. (2018), the hypothesis that trust positively affects consumer attitude is confirmed, through literature reviews and interviews. The evocation of positive emotions through sustainability labelling is showed in previous studies (Atkinson & Rosenthal, 2014).

Limitations

One reason for the positive evaluation of certification labels in this review is the presence of the studies regarding certifications. With eleven out of eighteen studies (nine out of eleven solely on certifications) included focussing on the effectiveness of certifications, a slight bias towards this type is generated. Information and interpretive labels present only five and four, respectively, studies in this review (two combined). It does look like future research will focus more on interpretive labels, especially in more cases than *just* carbon labels, so in the near future the topics will be more evenly matched. The effectiveness of single attribute labels is not evidentially shown in the literature in this review. Another limitation in this area is the absence of the focus on carbon-free labels in the search string. Luckily these experiments were gathered through the Snowball method, but an inclusion of this in the search string might have contributed to more evidence.

Another limitation in this review is a level of publication bias. Due to this bias a distorted representation of empirical data is presented on sustainability labelling. The published studies are not (fully) representative of all research carried out on this subject, which might be the reason for the low level of studies using information labels or the absence of single-attribute certification focusing experiments in this review.

In future this can be diminished through data gathering in so-called gray literature (Savoie et. al., 2003), analyzing data in other languages than English and through correlation tests (Begg & Mazumbar, 1994).

In total eight studies focused on willingness to pay for sustainable food options, incited by sustainability labels. A critical remark is however that due to the heterogeneity of the experiments, a clear visual of the increase or decrease in WTP is not representable. The measured products range from milk to coffee and from chocolate to salmon. An increase of two euros per kilo salmon does not say anything about the organic label, if that label is next examined on an apple. Since there are

various products, all with ranging conventional prices, absolute measures are not the best way to examine WTP. A solution for this, for future research, is to group certain products together under an umbrella term such as “sources of protein”, “hot / cold drinks” or “cookies and sweets”, and discuss the results in percentage values instead of absolute monetary values. To put it into perspective, salmon in Dutch supermarkets is priced around an average of €23,- per kilo (Albert Heijn; Jumbo). An increase of €2,- would be a 9% increase. This should then be grouped into other “sources of protein” to create a reliable list of outcomes. It is also important to acknowledge the difference in conventional prices in different areas.

In the area of consumer preference based on topic, the current literature on ethical labels is minor. A clear difference in effectiveness could result in the monitoring of the preferred type of label, which would then induce even more positive emotions (Jin et. al., 2018). However different studies suggest that there is no clear distinction based on label topic (Loureiro & Lotade, 2005; Annunziata et. al., 2011; Reinecke et. al., 2012; Giovannucci et. al., 2010). The “most preferred” label could also be caused by perceived credibility, personal experience or trust.

Research in context

This review contains information for marketers, policy makers and people interested in sustainability promotion or sustainability labels in general. Positive emotions to marketing stimuli are positively related with behavioural intentions (White & Yu, 2005; Kim & Lennon, 2013). This information can be used to persuade companies to produce (more) sustainable in order to obtain a sustainability label, so that consumers perceive their products as eco-friendly and therefore would be willing to pay more. This ultimately results in more sustainable production, which is the key objective of the sustainability-labelling process (Bozowsky & Mizuno, 2004). It can inform policy makers in the actual needs of consumers, and provide them with an understanding of the mechanisms that process certain labels provoke.

Due to the negative footprint, environmental impact of a pro-environmental labelled product and a conventional product is estimated lower than the conventional product alone (Gorissen & Weijters, 2016). Consumers are likely to underestimate the environmental impact of their food purchases when these purchases include green products (Gorissen & Weijters, 2016). Because of this, consumers might deliberately consume more in a misguided effort to reduce their impact, due to the negative footprint. This is shown in the study of Chernev (2011) in the dimension of nutrition. A so-called negative calorie illusion is to blame: people tend to underestimate the combined calorie content when confronted with a combination of healthy and unhealthy products (Chernev & Gal, 2010). Gorissen & Weijters (2016) suggest better informing consumers when it comes to carbon footprints of meal, resulting in them coming to more accurate estimates of environmental impact.

Lastly, this review can help consumers interested in sustainability labels see the effects that certain labels have, and also the biases that occur in presence of certain labels. Knowing about the bias you might occur can help to *debias*; reduce the effect of a bias, and thus result in more accurate decision making (Arkes, 1991).

References

Abrahamse et al. (2005) Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology*, 25, 273–291

Albert Heijn. www.ah.nl Retrieved on July 1st 2019

Allison, C., & Carter, A. (2000). Study on different types of environmental labelling (ISO Type II and III Labels): Proposal for an environmental labelling strategy. *Report for the European Commission, Environmental Resource Management, Oxford, UK.*

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39). Springer, Berlin, Heidelberg.

Ajzen, I., 2001. Nature and operation of attitudes. *Annual Review of Psychology* 52, 27–58

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social Behaviour. Englewood Cliffs, NJ: Prentice-Hall

Annunziata, A., & Vecchio, R. (2011). Functional foods development in the European market: A consumer perspective. *Journal of Functional Foods*, 3(3), 223-228.

Arkes, H. R. (1991). Costs and benefits of judgment errors: Implications for debiasing. *Psychological bulletin*, 110(3), 486.

Atkinson, L., & Rosenthal, S. (2014). Signaling the green sell: the influence of eco-label source, argument specificity, and product involvement on consumer trust. *Journal of Advertising*, 43(1), 33-45.

Bastianoni, S., Coscieme, L., Caro, D., Marchettini, N., & Pulselli, F. M. (2019). The needs of sustainability: The overarching contribution of systems approach. *Ecological Indicators*, 100, 69-73.

Begg, C. B., & Mazumdar, M. (1994). Operating characteristics of a rank correlation test for publication bias. *Biometrics*, 1088-1101.

Bernard, J. C., Duke, J. M., & Albrecht, S. E. (2019). Do labels that convey minimal, redundant, or no information affect consumer perceptions and willingness to pay?. *Food Quality and Preference*, 71, 149-157.

Birau, M. M., & Faure, C. (2018). It is easy to do the right thing: Avoiding the backfiring effects of advertisements that blame consumers for waste. *Journal of Business Research*, 87, 102-117.

Booth, A. (2006). Clear and present questions: Formulating questions for evidence based practice. *Library Hi Tech*, 24(3), 355–368.

Borgmeier, I., & Westenhoefer, J. (2009). Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study. *BMC public health*, 9(1), 184.

- Bozowsky, E., & Mizuno, H. (2004). Introduction to ecolabelling. *Ottawa: Global Ecolabelling Network*.
- Brosius, H. B., & Bathelt, A. (1994). The utility of exemplars in persuasive communications. *Communication Research*, 21(1), 48-78.
- Bush, S. R., Toonen, H., Oosterveer, P., & Mol, A. P. (2013). The 'devils triangle' of MSC certification: Balancing credibility, accessibility and continuous improvement. *Marine Policy*, 37, 288-293.
- Cagalj, M., Haas, R., & Morawetz, U. B. (2016). Effects of quality claims on willingness to pay for organic food: Evidence from experimental auctions in Croatia. *British Food Journal*, 118(9), 2218-2233.
- Cavagnaro, E., & George, H. (2017). *The three levels of sustainability*. Routledge.
- Cecchini, M., & Warin, L. (2016). Impact of food labelling systems on food choices and eating behaviours: a systematic review and meta-analysis of randomized studies. *Obesity reviews*, 17(3), 201-210.
- Chen, Y. S. (2010). The drivers of green brand equity: green brand image, green satisfaction, and green trust. *Journal of Business Ethics*, 93(2), 307-319
- Chernev, A. (2011). The dieter's paradox. *Journal of Consumer Psychology*, 21(2), 178-183.
- Chernev, A., & Gal, D. (2010). Categorization effects in value judgments: Averaging bias in evaluating combinations of vices and virtues. *Journal of Marketing Research*, 47(4), 738-747.
- Crockett RA, Jebb SA, Hankins M, Marteau TM. The impact of nutritional labels and socioeconomic status on energy intake. An experimental field study. *Appetite* 2014; 81: 12–19.
- Doane, D. (2001). Taking flight: The rapid growth of ethical consumerism. *London: New Economics Foundation*, 1.
- Edell, J. A., & Staelin, R. (1983). The information processing of pictures in print advertisements. *Journal of consumer research*, 10(1), 45-61.
- Emberger-Klein, A., & Menrad, K. (2018). The effect of information provision on supermarket consumers' use of and preferences for carbon labels in Germany. *Journal of cleaner production*, 172, 253-263.
- Ertz, M., François, J., & Durif, F. (2017). How consumers react to environmental information: An experimental study. *Journal of International Consumer Marketing*, 29(3), 162-178.
- Eze, U. C., & Ndubisi, N. O. (2013). Green Buyer Behavior: Evidence from Asia Consumers. *Journal of Asian and African Studies*, 48(4), 413-426.
- Feucht, Y., & Zander, K. (2018). Consumers' preferences for carbon labels and the underlying reasoning. A mixed methods approach in 6 European countries. *Journal of Cleaner Production*, 178, 740-748.

- Fraj-Andrés, E., & Martínez-Salinas, E. (2007). Impact of environmental knowledge on ecological consumer behaviour: an empirical analysis. *Journal of International Consumer Marketing*, 19(3), 73-102.
- Garretson, J. A., & Burton, S. (2005). The role of spokescharacters as advertisement and package cues in integrated marketing communications. *Journal of Marketing*, 69(4), 118-132.
- Giovannucci, D., Barham, E., & Pirog, R. (2010). Defining and marketing "local" foods: Geographical indications for US products. *The Journal of World Intellectual Property*, 13(2), 94-120.
- Goldstein-Piekarski, A. N., & Williams, L. M. (2019). A Neural Circuit-Based Model for Depression Anchored in a Synthesis of Insights From Functional Neuroimaging. In *Neurobiology of Depression* (pp. 241-256). Academic Press.
- Gorissen, K., & Weijters, B. (2016). The negative footprint illusion: Perceptual bias in sustainable food consumption. *Journal of Environmental Psychology*, 45, 50-65.
- Grunert, K. G., Hieke, S., & Wills, J. (2014). Sustainability labels on food products: Consumer motivation, understanding and use. *Food Policy*, 44, 177-189.
- Hallahan, K. (2000). Enhancing motivation, ability, and opportunity to process public relations messages. *Public Relations Review*, 26(4), 463-480.
- Handgraaf, M. J. J., Griffioen, A. M., Bolderdijk, J. W., & Thøgersen, J. (2018). Economic psychology and pro-environmental behaviour. In R. Ranyard (Ed.), *Economic Psychology* (435–450)
- Hanley, N.; Wright, R.E.; Adamowicz, V. (1998) Using Choice Experiments to Value the Environment. *Environ. Resour. Econ.* 1998, 11, 413–428
- Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: emerging concepts, methods and propositions. *Journal of marketing*, 46(3), 92-101.
- Homer, P. M. (1995). Ad size as an indicator of perceived advertising costs and effort: The effects on memory and perceptions. *Journal of Advertising*, 24(4), 1-12.
- Isomura, T., Murai, T., & Kano, M. (2017). Paradise lost: A new paradigm for explaining the interaction between neural and psychological changes in nicotine addiction patients. In *Addictive Substances and Neurological Disease* (pp. 281-291). Academic Press.
- Izuma, K., Saito, D. N., & Sadato, N. (2008). Processing of social and monetary rewards in the human striatum. *Neuron*, 58(2), 284-294.
- Janßen, D., & Langen, N. (2017). The bunch of sustainability labels—Do consumers differentiate?. *Journal of cleaner production*, 143, 1233-1245.
- Jin, J., Dou, X., Meng, L., & Yu, H. (2018). Environmental Friendliness Eco-labeling Matters: Evidence from ERPs study. *Frontiers in human neuroscience*, 12, 417.
- Joshi, Y., & Rahman, Z. (2019). Consumers' Sustainable Purchase Behaviour: Modeling the Impact of Psychological Factors. *Ecological Economics*, 159, 235-243.
- Jumbo Supermarkt. www.jumbo.com Retrieved on July 1st 2019

- Kim, J., & Lennon, S. J. (2013). Effects of reputation and website quality on online consumers' emotion, perceived risk and purchase intention: Based on the stimulus-organism-response model. *Journal of Research in Interactive Marketing*, 7(1), 33-56.
- Kocsis, T., & Kuslits, B. (2019). Multidimensional Labelling: Closing the Sustainability Information Gap between Producers, Consumers and Sustainability Science in the Food Sector. *Periodica Polytechnica Social and Management Sciences*, 27(1), 9-16.
- Lombardi, G. V., Berni, R., & Rocchi, B. (2017). Environmental friendly food. Choice experiment to assess consumer's attitude toward "climate neutral" milk: the role of communication. *Journal of cleaner production*, 142, 257-262.
- Loureiro, M. L., & Lotade, J. (2005). Do fair trade and eco-labels in coffee wake up the consumer conscience?. *Ecological economics*, 53(1), 129-138.
- Liu, Q., Yan, Z., & Zhou, J. (2017). Consumer choices and motives for eco-labeled products in China: An empirical analysis based on the choice experiment. *Sustainability*, 9(3), 331.
- Maaya, L., Meulders, M., Surmont, N., & Vandebroek, M. (2018). Effect of environmental and altruistic attitudes on willingness-to-pay for organic and fair trade coffee in Flanders. *Sustainability*, 10(12), 4496.
- de-Magistris, T., & Gracia, A. (2016). Consumers' willingness-to-pay for sustainable food products: the case of organically and locally grown almonds in Spain. *Journal of cleaner production*, 118, 97-104.
- McQuarrie, E. F., & Mick, D. G. (1996). Figures of rhetoric in advertising language. *Journal of consumer research*, 22(4), 424-438.
- Moon, W., Florkowski, W. J., Brückner, B., & Schonhof, I. (2002). Willingness to pay for environmental practices: implications for eco-labeling. *Land Economics*, 78(1), 88-102.
- Muller, L., Lacroix, A., & Ruffieux, B. (2019). Environmental labelling and consumption changes: A food choice experiment. *Environmental and Resource Economics*, 1-27.
- Nittala, R., 2014. Green consumer behavior of the educated segment in India. *J. Int. Consum. Mark.* 26 (2), 138–152.
- Olesen, I., Alfnes, F., Røra, M. B., & Kolstad, K. (2010). Eliciting consumers' willingness to pay for organic and welfare-labelled salmon in a non-hypothetical choice experiment. *Livestock Science*, 127(2-3), 218-226.
- Padel, S., Foster, C., 2005. Exploring the gap between attitudes and behaviour: understanding why consumers buy or do not buy organic food. *Br. Food J.* 107 (8), 606–625
- Pelsmacker, de, P., Driesen, L., Rayp, G., 2005. Do consumers care about ethics? Willingness to pay for fair-trade coffee. *J. Consum. Aff.* 39 (2), 363–385
- Pham, M. T. (2014). Feels Right... Go Ahead? When to Trust Your Feelings in Judgments and Decisions. *GfK Marketing Intelligence Review*, 6(1), 22-27.

- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (pp. 1-24). Springer, New York, NY.
- Phipps, M., Ozanne, L. K., Luchs, M. G., Subrahmanyam, S., Kapitan, S., Catlin, J. R., ... & Weaver, T. (2013). Understanding the inherent complexity of sustainable consumption: A social cognitive framework. *Journal of Business Research*, 66(8), 1227-1234.
- Reinecke, J., Manning, S., & Von Hagen, O. (2012). The emergence of a standards market: Multiplicity of sustainability standards in the global coffee industry. *Organization Studies*, 33(5-6), 791-814.
- Ricci, E. C., Banterle, A., & Stranieri, S. (2018). Trust to go green: an exploration of consumer intentions for eco-friendly convenience food. *Ecological economics*, 148, 54-65.
- Roberto CA, Bragg MA, Schwartz MB (2012) Facts up front versus traffic light food labels a randomized controlled trial. *Am J Prev Med* 2012; 43: 134–141.
- Robinson, R., Smith, C., 2002. Psychosocial and demographic variables associated with consumer intention to purchase sustainable produced foods as defined by the Midwest Food Alliance. *Journal of Nutrition Education and Behaviour* 34 (6), 316–325
- Rothschild, M. L. (1999). Carrots, sticks, and promises: A conceptual framework for the management of public health and social issue behaviors. *Journal of Marketing*, 63(4), 24-37.
- Rousseau, S. (2015). The role of organic and fair trade labels when choosing chocolate. *Food Quality and Preference*, 44, 92-100.
- Rousseau, S., & Vranken, L. (2013). Green market expansion by reducing information asymmetries: Evidence for labeled organic food products. *Food Policy*, 40, 31-43.
- Savoie, I., Helmer, D., Green, C. J., & Kazanjian, A. (2003). Beyond Medline: reducing bias through extended systematic review search. *International journal of technology assessment in health care*, 19(1), 168-178.
- Smith, S., Paladino, A., 2010. Eating clean and green? Investigating consumer motivations towards the purchase of organic food. *Australas. Mark. J.* 18 (2), 93–104.
- Tait, P., Saunders, C., Guenther, M., & Rutherford, P. (2016). Emerging versus developed economy consumer willingness to pay for environmentally sustainable food production: A choice experiment approach comparing Indian, Chinese and United Kingdom lamb consumers. *Journal of Cleaner Production*, 124, 65-72.
- Thøgersen, J. (2005). How may consumer policy empower consumers for sustainable lifestyles?. *Journal of consumer policy*, 28(2), 143-177.
- Tung, S. J., Shih, C. C., Wei, S., & Chen, Y. H. (2012). Attitudinal inconsistency toward organic food in relation to purchasing intention and behavior: An illustration of Taiwan consumers. *British Food Journal*, 114(7), 997-1015.
- Vanclay, J. K., Shortiss, J., Aulsebrook, S., Gillespie, A. M., Howell, B. C., Johanni, R., ... & Yates, J. (2011). Customer response to carbon labelling of groceries. *Journal of Consumer Policy*, 34(1), 153-160.

- Vermeir, I., Verbeke, W., 2006. Sustainable food consumption:exploring the consumer“attitude-behavioural intention”gap.Journal of Agricultural and Environmental Ethics 19 (2), 169–194.
- Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecological economics*, 64(3), 542-553.
- Vermeulen, S. J., Campbell, B. M., & Ingram, J. S. (2012). Climate change and food systems. *Annual review of environment and resources*, 37.
- Vlaeminck, P., Jiang, T., & Vranken, L. (2014). Food labeling and eco-friendly consumption: Experimental evidence from a Belgian supermarket. *Ecological Economics*, 108, 180-190.
- Walters, A., & Long, M. (2012). The effect of food label cues on perceptions of quality and purchase intentions among high-involvement consumers with varying levels of nutrition knowledge. *Journal of nutrition education and behavior*, 44(4), 350-354.
- Watson WL, Kelly B, Hector D et al. Can front-of-pack labelling schemes guide healthier food choices? Australian shoppers’ responses to seven labelling formats. *Appetite* 2014; 72: 90–97
- White, C., & Yu, Y. T. (2005). Satisfaction emotions and consumer behavioral intentions. *Journal of Services Marketing*, 19(6), 411-420.
- Wilson, A. L., Buckley, E., Buckley, J. D., & Bogomolova, S. (2016). Nudging healthier food and beverage choices through salience and priming. Evidence from a systematic review. *Food Quality and Preference*, 51, 47-64.

Appendix

Tab A.1. Level of evidence as specified by the Australian National Health and Medical Research Council criteria for intervention evidence (National Health and Medical Research Council, 1999; as indicated by Wilson et. al., 2016)

Level	Explanation
I (highest)	Evidence obtained from a systematic review of all relevant randomized controlled trials
II	Evidence obtained from at least one properly-designed randomized controlled trial
III-1	Evidence obtained from well-designed pseudo-randomized controlled trials (alternate allocation or some other method)
III-2	Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomized, cohort studies, case-control studies, or interrupted time series with a control group
III-3	Evidence obtained from comparative studies with historical control, two or more single arm studies, or interrupted time series without a parallel control group
IV (lowest)	Evidence obtained from case-series, either post-test or pretest/post-test