Reinventing ecolabels in the era of augmented reality: An experimental study on the case of fair-trade coffee

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Abstract

This research is interested in the effect of augmented reality (AR) technology on ecolabels' effectiveness. Based on a conceptual model, including control variables, the authors tested the effect of augmented and enriched information on evaluating messages around ecolabels and purchase intention for eco-labeled products. A between-subject experiment on fair-trade coffee involving 264 Canadian consumers was conducted. The experimental plan includes five cells: 2 (augmented reality: absence vs. presence) × 2 (information richness: low vs. high) + 1 control group (absence of ecolabel). The results confirm that AR and enriched information significantly increase the perceived quality and credibility of information around ecolabels, as well as purchase intention for eco-labeled products. Moreover, a significant interaction effect between the medium and the level of information detail was noted for purchase intention. This effect is influenced by the perceived novelty and coolness of the packaging, the degree of the perceived complexity of AR, the level of consumer involvement with the product, and income.

Keywords: augmented reality, fair trade, information richness, perceived information credibility, perceived information quality, smart ecolabel

1. Introduction

Is this the end of ecolabels? Ecolabels are signals commonly used by companies to convince consumers of their environmental and/or social commitments (Galarraga Gallastegui, 2002; Dekhili & Achabou, 2014). However, various studies have pointed to their lack of credibility and information shortcomings in the actual valuation of offers. There are multiple sources of these deficiencies. First, companies are often accused of using ecolabels for the sole purpose of selling or charging more (i.e. greenwashing) (Shahrin et al., 2017). Second, there is a high cost of adoption (i.e. time, money, effort and skills) of ecolabels, especially for smaller companies (Iraldo et al., 2020). Third, adoption costs may percolate on the price so that demand for ecolabelled products might be limited to niche consumers (Salladarré et al., 2010), and willingness to pay for ecolabels remains low to increase sales volume (Janßen & Langen, 2017). Thus, ecolabels may not really change consumption and production patterns (Darnall & Aragón-Correa, 2014; Giacomarra et al., 2021). Fourth, consumers may distrust ecolabels because they are numerous[1], complex (Harbaugh et al., 2011; Yokessa & Marette, 2019) and incomplete (Dekhili & Achabou, 2013; 2015), increasing their doubts about the sincerity of the certifiers and the requirement levels (Dekhili & Achabou, 2014; Adamkiewicz et al., 2022). Even though ecolabels are delivered by independent third parties, consumers' levels of expertise are often insufficient, preventing them from understanding the content and

[1] The Ecolabelindex.com site lists 456 environmental labels in 199 countries.

counterbalancing the asymmetry of information (Lavallée & Barenstein, 2004; Wang et al., 2022). Also, many ecolabels pertain to environmental sustainability, whereas Plank and Teichmann's (2018) facts panel revealed that social responsibility is more important to consumers.

Consequently, a body of research pointing out the ineffectiveness of ecolabels has gradually taken over from studies that have focused on the positive effects of these signals (e.g. Dekhili & Achabou, 2013; 2015; Harbaugh et al., 2011; Yokessa & Marette, 2019; Adamkiewicz et al., 2022). Yet, one key factor accentuating the lack of credibility of ecolabels that has remained underexplored until now but could potentially improve the information quality and purchase intentions of ecolabelled products lies in the information surrounding ecolabels (Dekhili & Achabou, 2015; Dekhili & Nguyen, 2021). A little research body has mainly debated the question of ecolabel formatting on purchase intentions. More specifically, some authors (Kim et al., 2016; Sahin et al., 2020) have investigated the combination of text and images. Rihn et al. (2019) suggested that images (i.e. ecolabel icons) attract more visual attention and a higher willingness to pay than textual ecolabels, whereas Wang et al. (2022) suggested that adding descriptive text to ecolabels improves consumers' cognitive fluency in ecolabels and purchase intentions. Ertz et al. (2017) discovered some mixed findings in that consumers perceive equal levels of product quality and environmental information credibility under both elaborated environmental claims along with ecolabelling cues and limited environmental claims along with no ecolabelling cues. However, they used self-declared environmental claims instead of a formal ecolabel description and environmental labelling cues instead of a real or even fictional ecolabel, which may account for those findings. Hence, the current state of

research doesn't shed the light on the "optimal" amount of information to display to guarantee ecolabel quality and credibility and spur purchase intentions. Consumers have different needs for cognition (NFC) (Petty & Cacioppo, 1986), and more information could deter consumers with lower NFC levels.

Considering recent technological developments, hopes are emerging to improve communication around ecolabels. Technology such as augmented reality (AR) is beneficial in this regard because 1) it offers the possibility of adding supplementary information by simultaneously superimposing multimedia elements (e.g., text, sound, video, and images) on reality to enrich existing physical reality (Masood & Egger, 2020); 2) it can make it possible to display on the packaging, optionally, additional information about the adopted ecolabel, which can help to reinforce its credibility (Spaargaren et al., 2013); and 3) in contrast to mixed reality or virtual reality (e.g., metaverse), AR is less pervasive or immersive, and is thus well-suited to a physical shopping environment. AR technology, therefore, has the advantage of adapting the amount of information to the target, which is difficult to achieve with physical packaging.

Despite AR technology's opportunities to renew marketing practices, approaches and frameworks, it remains underexploited (Ma & Sun, 2020 ; Wedel et al., 2020). If the literature has recently tested the effect of technological innovations in the pricing (Garus et al. 2016), distribution (Yim et al. 2017; Grudzewski et al. 2018), and product (Sauerwein et al., 2019) contexts, one unexplored mix-marketing aspect is how AR technology affects communication, which is the central issue of our study. This article addresses this research gap by aiming to determine the optimal quantity of information, allowing for better ecolabel effectiveness.

The potential link between “technology” and “ecology” is of considerable interest to the green market and could help to encourage ecological consumption behaviors (Ochs & Schmitt, 2021). However, very little is known about this relationship (Tseng et al., 2018), hence the relevance of this research. More specifically, we propose to answer the following questions:

RQ1) Should the information around ecolabels be short, capable of capturing the consumer’s attention, or detailed to increase the quality and credibility of the signal and purchase intentions, but which carries a risk in terms of information overload?

RQ2) How could the richness of information, thanks to AR, increase the quality and credibility of ecolabels as well as purchase intentions?

To provide some possible answers, we proceed in this article as follows. In the first part, we explore, on the one hand, the literature on ecolabelling and, on the other hand, that on 4.0 technology and the opportunities it offers in terms of optimizing information, which makes it possible to formulate research hypotheses. In the second and third parts, respectively, we develop the methodology adopted and the results obtained. At the end of the article, we offer a discussion and then formulate contributions at the theoretical and managerial levels.

2. Literature review

2.1. Information around ecolabels: A persisting complex issue

The ecolabel constitutes a signal in the sense of Spence (2002), that is, a form of communication that allows the transmission of credible information from advertisers to consumers. Because the ecological performance of a company is challenging to observe

and verify by the target, the ecolabel becomes a means of reducing the informational asymmetry surrounding the ecological quality of the offers (Van Amstel et al., 2008; Mason, 2009). According to the postulates of the signal theory, the use of an ecolabel serves to restore a balance between the two parties—businesses and consumers. On the one hand, it offers the advertisers the opportunity to prove their honesty, consolidate their reputation, distinguish themselves from less committed companies, and increase their sales; on the other hand, it helps the consumer to infer a judgment on the ecological quality and the credibility of the offer, thus facilitating purchasing decisions (Connelly et al., 2011). Ecolabels often increase consumers' willingness to pay (Loureiro & Lotade, 2005), contribute to reducing the products' research cost for consumers (Grunert & Wills, 2007), steer consumption patterns toward greater sustainability (Iraldo et al., 2005; Howard & Allen, 2010), and encourage producers and governments to increase the ecological standards of goods (Galarraga Gallastegui, 2002).

Despite the advantages mentioned above, several limitations hinder the effectiveness of ecolabels. First, ecolabels may distort prices and other relevant information considered by consumers when selecting products. On the producers' side, they may distort the allocation of resources and generate inefficiencies (Galarraga Gallastegui, 2002). Second, the diversity of environmental and social claims on the market and the heterogeneity of labelling programs, particularly at the international level, have not helped make these signals credible in the eyes of the target (Yokessa & Marette, 2019). The credibility issue is fundamental in the case of ecological claims, as a low credibility level of ecolabels can reduce consumers' expectations regarding the benefits of sustainable products and reduce their willingness to purchase them (Nuttavuthisit and Thøgersen,

2017). According to Gallastegui (2002), "*one of the aims of ecolabels is to create an easy identifiable and reliable mark of credibility*" (p. 320).

The excessive recourse of companies to ecolabelling associated with the spread of the greenwashing phenomenon tends to reduce ecolabels' observability, favor negative evaluations of the actors' sincerity and tend to generate a risk of consumer confusion (Horne, 2009; Dekhili & Achabou, 2013), tarnishing the image of ecolabels (Marder & Dodd, 2012), and conducting to "label fatigue" (Howard & Allen, 2010). In this context, and while one might think that institutionalization, that is, the use of an independent third party, would guarantee the effectiveness of the signal (Nuttavuthisit & Thøgersen, 2019), research has come to challenge this idea. Indeed, Dekhili and Achabou (2013) showed that while the intervention of an external body increases consumer confidence in ecolabelling, it does not completely reassure him or her, and that skepticism extends to official certifications. In this sense, and as Mason (2009) indicated, the benefits related to improving information through third-party certification are smaller than the costs of providing that information.

To have confidence in the information around ecolabels, consumers should be certain of their veracity and enforcement (Howard & Allen, 2010). In this way, the labeling process needs to be transparent, and to enhance the cue's credibility, it is suggested that the certifying body should also be certified by an external actor (Suchman, 1995).

Third, the ecolabelling process is often based on an ambiguous and incomplete approach that only incorporates a limited number of criteria (Thøgersen et al., 2010), which hinders the comprehension of the cue and conduct to possible unfavorable perceptual shortcuts (Dekhili et al., 2021a). To facilitate product evaluation in this case, consumers tend to

mobilize additional signals (brand, price, geographical origin, etc.). Some studies have confirmed the interaction effects between the ecolabel and the country-of-origin ecological image of the product (Dekhili & Achabou, 2015), between the ecolabel and eco-friendly materials (e.g. outdoor textiles providers seeming particularly important in light of sustainability) (Brand & Rausch, 2021; Brand et al., 2022) or even between the ecolabel and the brand (Dekhili & Nguyen, 2021). Nikolaou and Tsalis' (2018) proposition tried to solve this issue by suggesting a composite index to evaluate the overall sustainability performance of products and firms, but the methodology remains to be deployed and generalized among practitioners.

Thus, ecolabels should convey the standards and sustainable criteria considered in a way that is entirely understandable to the target (Boström & Klintman, 2008; Dekhili & Achabou, 2015). In this sense, Ertz et al. (2017) showed that environmental claims are considered more credible and refer to better quality products when explanations of the ecolabelling process accompany the information. In this sense, O'Brien and Teisl (2004) called for mobilizing different media and marketing techniques to provide consumers with sufficient information. However, the risk of an information load in the case of detailed information can lead to the rejection of the ecological offer, especially among consumers with a low need for cognition (Cacioppo & Petty, 1982). Additionally, the space constraint on paper packaging does not allow information about ecolabels to be displayed in a clear and detailed manner.

With the exception of Marshall (1987) who studied the impact of information quantity (i.e., ingredient information quantity) on perceived product quality - but not on perceived credibility, and the managerially relevant variable of purchase intentions - to our

knowledge, to date, no research has tackled the question of the optimal quantity of information relating to an ecolabel and has not empirically studied the impact of the richness of information on the effectiveness of ecolabels; hence, this provides the relevance of our study.

2.2. Augmented reality: Hope for more effective information around ecolabels

Emerging initiatives promote technological innovations as a possible way to accelerate the ecological transition. We can cite the example of the proliferation of green applications that tend to encourage responsible consumption (e.g., anti-waste applications and the sustainable compass) or even the use of the Internet of Things to facilitate the transition to renewable energies Folco, 2019). In this sense, Wedel et al. (2020) reported that 55% of consumers globally believe that AR and virtual reality will become as widespread as smartphones.

At the academic level, even if "technology" and "ecology" can be linked (de Sousa Jabbour et al., 2018), and tools have been developed to manage environmental performance (Honkasalo, 1998), authors (Tseng et al., 2018) point to the scarcity of work exploring the opportunities for crossing the two notions. Regarding the field of marketing, Ma and Sun (2020) highlighted a lack of research on the issue of 4.0 technology.

Marketing studies that have examined the ecological issue while considering technological change have mainly focused on the role of 4.0 technologies in extending the lifespan of products (Ertz et al., 2021; Sauerwein et al., 2019). For example, big data, the Internet of Things, artificial intelligence, and 3D printing can be combined to contribute to a refined understanding of the entire product lifecycle and the optimization of sustainable

solutions (Charnley et al., 2019). Tseng et al. (2018) identified their role in enhancing ecological consumption as an essential and urgent research perspective.

Regarding the subject of ecolabelling, classic ecolabels indicate static and limited information that does not consider the diverse profiles of consumers and their information needs. This shortcoming could be overcome using smart ecolabels, which, via filtered information with dynamic extraction, offer relevant information to consumers.

Detailed information can be communicated in augmented form, that is, on the initiative of the consumer if he or she wishes to know more about the ecological characteristics of the product and to use a QR code that can be activated by a smartphone. If the information on the packaging is considered sufficient by a given consumer, this excess information should not be provided because it may put off the target, particularly consumers who do not necessarily want to know more about the ecological characteristics of the product or those with a lower need for cognition (Cacioppo & Petty, 1982). Adapting information is difficult in physical packaging (Ertz et al., 2017), but it is possible with AR. Thus, in this research, we will focus on AR technology, which aims to enhance the perception of the real world through digital information (Carmigniani et al., 2011). AR is the technology under consideration because it is the easiest to operationalize in the contemporary technological infrastructure. Indeed, unlike virtual reality, it fits into the physical context without dissociation. Also, unlike mixed reality, which requires a dedicated headset and whose use is far from widespread, AR requires only a smartphone, an accessory that almost everyone now owns. AR would allow a company to provide additional and optional information on the packaging regarding the ecolabel used.

3. Theoretical framework

3.1. The modality, agency, interactivity, and navigability (MAIN) model

The technological revolution has contributed to the profusion of user-generated content, which raises the question of the quality and veracity of content and calls for the constant verification of information content while consuming it. In this sense, the modality, agency, interactivity and navigability (MAIN) model (Sundar, 2008) and the associated heuristics highlight the issue of the perceived quality and credibility of information in the case of signal effects transmitted by technological affordances. Perceived credibility is defined as the "believability of information being received" (Sundar, 2008, p. 74) whereas the concept of perceived quality has multiple definitions but "encompasses such considerations as utility, importance, relevance, completeness, level of detail, clarity, variety, accessibility, trustworthiness, uniqueness, timeliness, and abjectivity" (Sundar, 2008, p. 80).

The model's starting point is an affordance offered by the technology, which means a particular capacity specific to the medium, making it possible to facilitate a certain action. Such an affordance conveys a signal that serves as a trigger for heuristics. A heuristic is a rule of judgment that can lead to an appreciation of the quality (e.g. usefulness, importance, relevance, detail, clarity, variety, accessibility, uniqueness, timeliness and objectivity) of information. According to this model, these considerations influence the perception of the credibility of the information. The latter is commonly determined by the source delivering the information and by the media's credibility (Sundar, 2008).

Based on the MAIN model, we retained two variables in the rest of this research: the perceived quality and perceived credibility of the information. This choice could be justified for two reasons: first, because it is adapted to 4.0 technologies and second, because

it corresponds to the credibility surrounding information on ecolabels (Dekhili & Achabou, 2013).

We also consider behavioural intentions, a widely used and generalized dependent variable in benchmark consumer behaviour models and defined as "the motivational factors that influence behavior" (Ajzen, 1991 in Asare et al., 2015, p. 2), so that "the stronger the intention to engage in a given behavior, the more likely it is to perform that behavior" (Asare et al., 2015, p. 2). The idea is to determine how the use of AR will increase the perceived quality, the perceived credibility of information around ecolabels and the intention to purchase ecological products.

3.2. Media richness theory

In addition to the MAIN model which points toward the influence of technological affordances through signal effects on the perceived quality and credibility of information as well as of purchase intentions, media richness theory (MRT). According to Daft and Lengel's (1986) media richness theory (MRT), media differ in their richness and effectiveness. In fact, different types of media vary according to their ability to communicate meaning at a given moment (Suh, 1999). MRT suggests that four criteria make it possible to measure the richness of a medium: (1) the ability of the medium to transmit multiple signals (e.g. graphic symbols, gestures or voices); (2) immediacy of feedback (i.e. high level of interactivity); (3) the variety of language allowed by the medium, that is, the range of meaning that can be conveyed via linguistic symbols (metaphors, numbers, etc.); and (4) personal focus, which refers to the personalization of the message (Gimpel et al., 2016). The theory suggests that a richer medium allows users

to communicate more quickly and better understand complex, ambiguous and equivocal messages (Dennis & Kinney, 1998).

4. Conceptual framework and hypotheses development

4.1. Information support

Drawing on the MAIN model and MRT, AR exerts a similar effect to virtual reality (VR) in that it provides a comparatively richer communication medium that combines visual and audio dimensions while allowing users to access more information (Ouerghemmi et al., 2023). Various studies have underlined the positive effect of a digitized medium on the evaluation of the information conveyed (e.g., Garus et al., 2016; Grudzewski et al., 2018; Ouerghemmi et al., 2023). Thus, in the field of advertising, AR-based advertisements have been shown to promote positive attitudes toward the brand and to lead to better effectiveness of the message delivered (Grudzewski et al., 2018). In other terms, the information appears more credible. Also, in the context of research on prices, Garus et al. (2016) confirmed that a dynamic price display via a system of connected electronic labels (versus a traditional display) generates positive inferences around quality. Besides, several authors have noted the positive impact of digitized media on purchase intention. From a broad perspective, technological innovations tend to make stores more aesthetically attractive, thus influencing consumer behavior (Poncin & Ben Mimoun, 2014). More specifically, Yim et al. (2017) showed a positive effect of AR applications on purchase intentions in the distribution sector. Similarly, Grudzewski et al. (2018) found that AR-based advertising stimulates purchase intentions. Thus, ecological information that is more precise through textual or pictorial complements accessible by AR could be perceived as more credible and of better quality in consumers' eyes and thus encourage

them to purchase ecological products. It follows that the support of information affects the evaluation of this information and the consumer's intention to purchase it. From the above, we can postulate that the medium of the information affects the evaluation of this information and the consumer's purchase intention. Thus, the following hypothesis was formulated:

H1a: The perceived quality is higher in the case of a display using AR, in comparison with the case of a display on a paper medium.

H1b: The perceived credibility of the information is higher in the case of a display using AR, in comparison with the case of a display on a paper medium.

H1c: The purchase intention is higher in the case of a display using AR, in comparison with the case of a display on a paper medium.

4.2. Information richness and content evaluation

According to the MAIN model, regarding the message itself, its level of elaboration can increase perceived quality and credibility, particularly favoring the heuristic "length implies power," leading to the conclusion that the message is powerful, a conclusion drawn without considering the content of the message (Sundar, 2008). Another relevant judgment rule for assessing the quality and credibility of information is the expertise heuristic ("expert statements can be trusted"), which is often invoked simply by using an expert source to deliver a message (Sundar, 2008). Past research already showed that the perceived credibility of ecological information increases not only in the presence of an ecolabel but also when it is accompanied by detailed information (Spaargaren et al., 2013; Ertz et al., 2017). In this sense, we can assume that additional information (i.e., information

richness) could help strengthen not only the credibility but also the quality of ecolabels while increasing purchase intentions. Therefore:

H2a: The perceived quality is higher in the case of enriched information, in comparison with reduced information.

H2b: The perceived credibility of the information is higher in the case of enriched information, in comparison with reduced information.

H2c: The purchase intention is higher in the case of enriched information, in comparison with reduced information.

4.3. Interaction of information support and amount

Also, AR can superimpose multimedia elements (e.g., text, sound, video, or images) on reality and simultaneously enrich existing physical reality (Egger & Masoud, 2020). Therefore, we can assume that, while the paper medium is more related to the display of reduced information, AR is more associated with opportunities for information enrichment. Thus, an interaction between the information medium and the amount of information around the ecolabel may exist. This leads to the following assumptions:

H3a: The positive effect of the enriched information around the ecolabel on the perceived quality of the information is stronger in the case of the information medium mobilizing AR in comparison with the paper medium.

H3b: The perceived credibility of the information is stronger in the case of the information medium mobilizing AR in comparison with the paper medium.

H3c: The purchase intention is stronger in the case of the information medium mobilizing AR in comparison with the paper medium.

All the hypotheses considered in this article and the resulting conceptual model are shown in Figure 1.

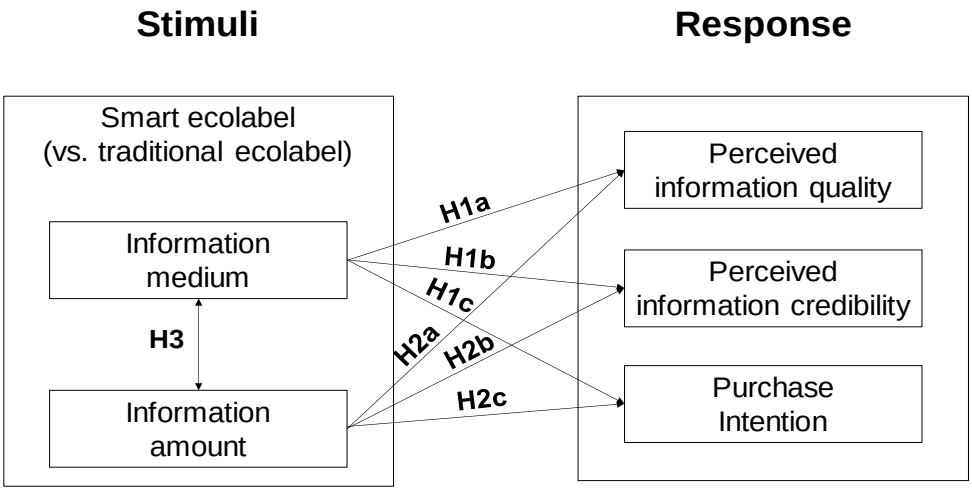


Figure 1. Conceptual model of the effect of augmented and enriched information on the evaluation of the ecolabel and purchase intention for ecolabelled products.

5. Methodology

5.1. Research design

The study uses a quantitative research design, and more specifically, a randomized experimental design, consisting of a between-subject experiment on fair-trade coffee involving Canadian consumers. The experimental plan includes five cells as follows: 2 (augmented reality: absence vs. presence) × 2 (information richness: low vs. high) + 1 control group (absence of ecolabel).

5.2. Product, ecolabel and brand choices

While many food products have benefited from differentiation based on sustainability criteria (tea, sugar, honey, bananas, rice, etc.), coffee is considered the product most affected by this differentiation (Mason, 2009). For example, the world coffee export segment, which has been the subject of responsible initiatives, represents 10% of the total world export earnings, thus registering the strongest growth in the markets of developed countries (Intracen, 2019). Also, coffee has been closely linked to the notion of fair trade since it emerged in 1860, when injustices in negotiating the product between Indonesia and the Netherlands were revealed. As a result, coffee is the most consumed fair-trade product. In 2021, it represented 37% of the sales of international sectors (in value) (Observatoire du CE, 2021).

In terms of ecolabels, we opted for Max Havelaar. Initially, Max Havelaar was the hero of Edouard Douwes Dekker's novel on the inequality of trade between Indonesia and the Netherlands (Feenberg, 1997). Then, in 1980, the certified version of fair trade was born on the initiative of the Dutch NGO Solidaridad, and its associated label took the name Max Havelaar (Bartley & Smith, 2010). It is an international ecolabel that aims to strengthen the position of small producers and benefits from a reputation among consumers, given its seniority in the market (Bennett, 2013, 2016).

Finally, the coffee brand used in this study is Ethical Bean, founded in Canada in 2003 and now belonging to the Kraft Heinz Company. Ethical Bean coffee is 100% fair trade, organic and roasted in Canada. The brand is based in Vancouver and with revenues ranging between $5 and $10 million, it is one of the leaders in the organic and fair-trade coffee market in the country (Business Wire, 2018). Also, the brand is distributed widely

including by Walmart, the most popular supermarket chain in North America. Also, the brand has already implemented augmented information on packaging to specify the traceability of its products.

5.3. Control variables

Several control variables were used to determine the sources of potential variations in the results. First, familiarity with the brand will be used as a control variable (David et al., 2005) to ensure that knowing the brand tested will not bias the measured effects. Second, we rely on the variables of Sundar's (2008) MAIN model, which offers a fascinating approach to exploring the effects of signals transmitted by new technologies on the credibility of information. In particular, we consider the variables "perceived coolness" (Sundar et al., 2014), "perceived novelty" (Wells et al., 2010), and "perceived bells-and-whistles," which are typically related to the use of new technology. Additionally, we include perceived intrusiveness (Hairong et al., 2002), experience with AR (Venkatesh & Davis, 2000), attitude toward AR use (Agarwal & Karashanna, 2000), degree of freedom in the use of AR (desired and non-forced personal use) (Venkatesh & Davis, 2000), perceived complexity of AR (Igbaria et al., 1996) and need for cognition (Lins by Holanda Coelho et al., 2020). Also, knowledge of the ecolabel, as well as its use, constituted two separate control variables (Thøgersen et al., 2010). Furthermore, it is necessary to ensure that the degree of involvement with the product tested (Zaichkowsky, 1985) does not pose any bias in the estimation of the measures, any more than the frequency of its consumption or the degree of ecological concern (De Pelsmacker & Janssens, 2007). Finally, gender, age, socio-professional category and income will be included as control variables (Dekhili & Nguyen, 2021).

5.4. Experimental procedure

An "augmented reality × information richness" between-subjects experimental design was used to test the hypotheses.

Concerning AR, we distinguish between 1) a paper version of the ecolabel (absence of AR) and 2) an augmented version presenting a QR code that can be activated using a smartphone. The latter offers media richness that is impossible with the paper version. Thus, in the case of AR, the participants watch a video in which an avatar appears to read the same information as that presented in the paper version; the script of the information read is subtitled in the video.

For the richness of the messages, we consider, on the one hand, 1) reduced information accompanying the ecolabel "*Max Havelaar acts for fair trade, respectful of human rights and the environment*" and, on the other hand, 2) enriched information "*Max Havelaar works for fair trade, respectful of human rights and the environment. The control of the application of the rules is ensured by FLOCERT, an independent certification body. Its inspectors regularly carry out field checks at each stage of production. In companies – processors, roasters, importers.*" The texts selected were taken from information published on the Max Havelaar website (https://maxhavelaarfrance.org/).

We considered a control group that was not exposed to the ecolabel. Thus, the experimental plan includes five cells: 2 (augmented reality: absence vs. presence) × 2 (information richness: low vs. high) + 1 control group (absence of ecolabel). Five groups of approximately 50 Canadian consumers were considered. Respondents were randomly assigned to one of five groups.

To approximate real purchasing situations, additional information (besides that related to manipulations) was added identically in each scenario. Thus, we retained an identical price (USD 7.96) for a pack of 224 grams (8 ounces) of organic Arabica ground coffee from the classic range. This information corresponds to the characteristics of products marketed by the Ethical Bean brand.

For each scenario, respondents were asked about the perceived quality of the information, its perceived credibility, and their behavioral intentions.

Finally, given that coffee is widely distributed in supermarkets, the following sentence was used to introduce the scenarios to respondents: "*You are in a supermarket, and you are looking for ground coffee for your own consumption. Then, you see the following product with the information described in the picture*." We chose this specific context because in consumer-packaged good retail environments, consumers are typically influenced by packaging information, more than in a restaurant or café where they receive the coffee already prepared with very limited knowledge of the ingredients and items used to prepare it.

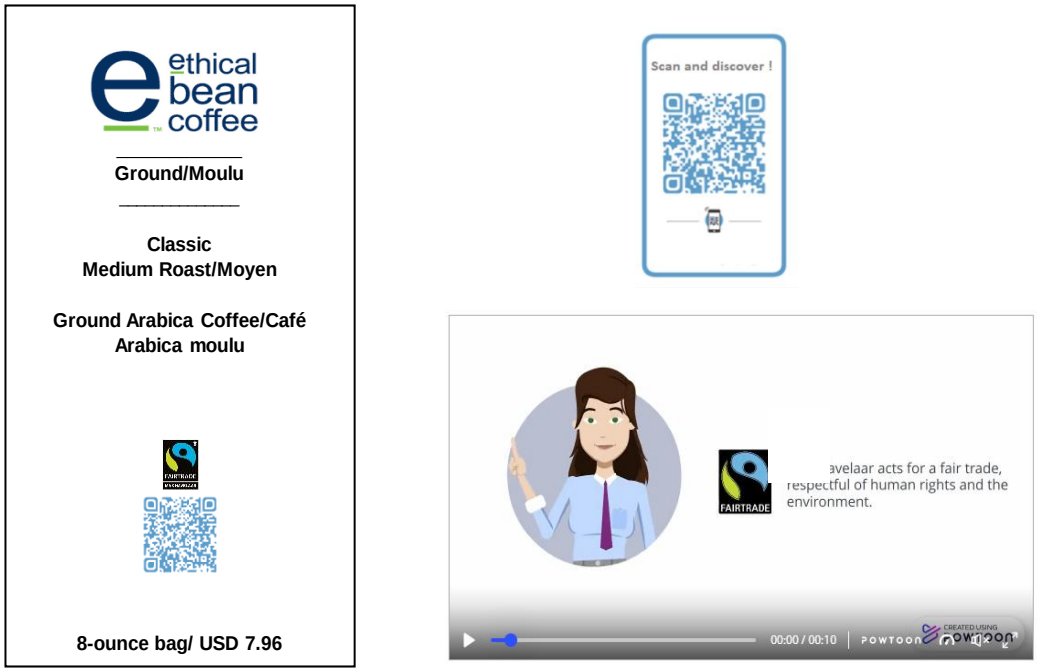
5.5. Design of scenarios and measurement scales

For scenarios referring to AR, packaging prototypes featuring a QR code with associated content (a video with an avatar) were created. Figure 2 illustrates the different versions of the scenarios presented to the respondents.

a) Paper version of the ecolabel and low information richness

b) Paper version of the ecolabel and high information richness

c) Augmented version of the ecolabel and low information richness



d) Augmented version of the ecolabel and high information richness

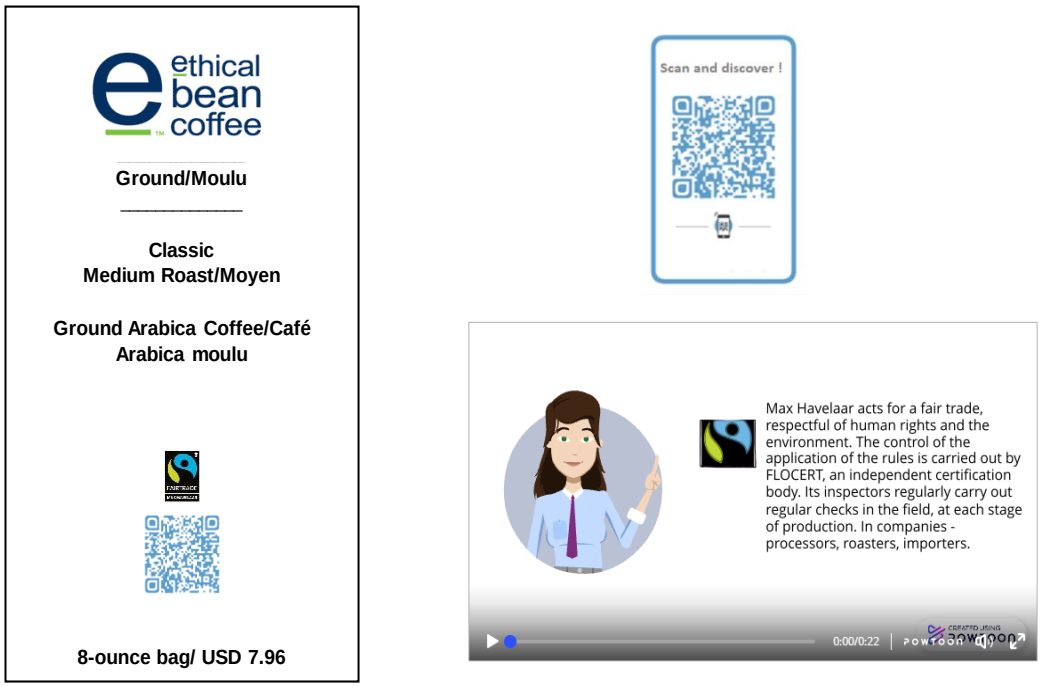


Figure 2. Different versions of the scenarios presented to the respondents

As shown in Appendix 1, all measurement scales were taken from the literature. Respondents indicated their answers on 7-point Likert scales ranging from "strongly disagree" to "strongly agree."

Dependent variables. The perceived quality of the information was examined using the three items of Xu et al.'s (2013) scale. Next, the perceived credibility of the information was measured using 10 items from Prendergast et al. (2009). Finally, to measure behavioral intention, the three-item scale of Venkatesh and Davis (1996) was used.

Control variables. The two variables, "perceived coolness" and "perceived bells-and-whistles," were measured using the three-item scales of Sundar et al. (2014). Perceived novelty was operationalized using the three items of Wells et al. (2010). In terms of perceived intrusiveness, we used Hairong et al.'s (2002) seven items. Attitude toward using AR was measured by the four items of the scale of Agarwal and Karashanna (2000). For the two variables, "experience with augmented reality" and "voluntarism," the scales of Venkatesh and Davis (2000), comprising two and three items, respectively, were considered. Regarding perceived complexity, the three-item scale of Igbaria et al. (1996) was retained. The need for cognition was examined using six items from the Lins scale of Holanda Coelho et al. (2020). To measure the respondents' knowledge and use of the ecolabel, the uni-item scales of Thøgersen et al. (2010) were used. Familiarity with the brand was measured using the uni-item scale of David et al. (2005). Then, for involvement with the tested product (coffee), the five items of the Zaichkowsky scale (1985) were adopted. Concern for fair trade was measured using the three items of De Pelsmacker and Janssens' (2007) scale. Also, information on the characteristics of the respondents was collected, including gender, age, socio-professional category, income, and frequency of

fair-trade coffee consumption. All the details of the measurement scales can be found in Appendix A.

5.6. Data collection

The questionnaire was computerized using LimeSurvey software and then paired with the crowdsourcing platform Amazon MTurk, from which North American consumers were recruited to participate in the study. This platform for recruiting respondents is widely used in marketing research (Han et al., 2019). Moreover, although the sampling frame is non-random because it is based on a panel, many research works (e.g., Casler et al., 2013) highlight that the data obtained from MTurk through non-random sampling frames are at least as reliable as those obtained by traditional methods.

Consumers were recruited in Canada in June 2021. Canada is an interesting field to investigate since it has a growing market segment attached to socioecological criteria when buying products. For example, the EY Future Consumer Survey Index showed that 69% of Canadian consumers expect companies to solve sustainability issues and 61% of them are willing to pay more attention to the environmental impact of what they consume (EY, 2021). Besides, one of the authors was precisely from Canada and had access to data on the Canadian market. So, respondents had to reside in Canada and be at least 18 years old. Each respondent was paid CAD 0.50 to participate in the study. The questionnaires were offered in English because most of the population in Canada, including a significant proportion in Quebec, speaks English or, at least, has English as a second language. In the end, 289 respondents agreed to participate in the survey, but only 264 questionnaires were considered in the analysis due to missing data or outliers. Table 1 shows the demographic characteristics of the sample.

Table 1. Sample characteristics

	Frequency	Proportion (%)
Total number of respondents	264	100
Gender		
Male	199	75.38
Female	65	24.62
Age		
18–24 years old	18	6.82
25–44 years old	210	79.55
45–64 years old	30	11.36
65 years old and over	6	2.27
Annual household income		
Less than $20,000	27	10.23
$20,000–$49,999	87	32.95
$50,000–$79,999	104	30.39
$80,000–$119,000	45	17.05
$120,000 and over	1	0.38
Fair-trade coffee consumption (***M* = 3.88 ; s.d. = 0.94**)		
Never	5	1.89
Rarely	14	5.28
Occasionally	62	23.40
Regularly	111	41.89
Every day	73	27.55
Number of years of using augmented reality		
1 year or less	47	17.74
2–4 years	95	35.85
5–10 years	76	28.68
11 years and over	46	17.73

6. Results

6.1. Descriptive results

Table 2 presents the descriptive statistics. First, respondents generally "rather agree" with the perceived quality, perceived credibility, and intention to buy the product. Indeed, the average scores gravitate around the value 5, corresponding to "somewhat agree." The same is true for the control variables, whose means oscillate between 4.5 and 5.5 (4 indicates "neither agree nor disagree") and a central tendency around the value of 5. The

highest average (5.29) relates to the degree of concern about fair trade, which could be partly due to the social desirability bias of the respondents. On the other hand, the lowest score (4.83) was linked to the knowledge variable of the Max Havelaar ecolabel.

Table 2. Descriptive statistics and reliability measures

Variables	Mean (1–7)	s.d.	Skewness	Kurtosis	Cronbach's Alpha	AVE	CR
Dependant variables							
Perceived information quality	5.00	1.22	-1.15	1.48	0.86	0.790	0.92
Perceived information credibility	5.17	0.92	-1.14	2.60	0.92	0.570	0.93
Intention to buy	5.07	1.12	-1.60	2.74	0.84	0.750	0.90
Control variables							
Perceived coolness	5.02	1.30	-1.33	1.77	0.87	0.800	0.92
Perceived novelty	5.19	1.07	-1.04	1.71	0.79	0.700	0.88
Attitude towards using augmented reality	5.25	1.00	-1.10	2.36	0.80	0.711	0.88
Perceived complexity	4.96	1.13	-0.96	0.51	0.78	0.690	0.87
Need for cognition	5.13	1.17	-1.24	2.16	0.87	0.720	0.91
Involvement with coffee	5.23	0.96	-1.22	2.41	0.83	0.600	0.88
Concern for fair trade	5.29	0.98	-0.77	1.26	0.74	0.660	0.85
Knowledge of the ecolabel Max Havelaar	4.83	1.58	-0.92	0.49	---	---	---
Use of the ecolabel Max Havelaar	4.88	1.57	-0.89	0.47	---	---	---
Experience with AR	4.92	1.19	-0.79	1.13	---	---	---
Familiarity with the brand Ethical Beans	4.92	1.60	-0.88	0.34	---	---	---

Note: CR = Coefficient of reliability; AVE = Average variance extracted.

6.2. Manipulation check

Respondents were asked to rate on a 7-point Likert scale the level of detail surrounding the information surrounding the tested ecolabel "Max Havelaar." Since the data are normally distributed (see Table 2) and independent, the residuals are normally distributed, and the variances of the sampled populations are equal, a manipulation check with an ANOVA test confirms that the group exposed to the enriched information perceived more detailed content than the group exposed to reduced information or even in comparison to the control

group ($M_{enriched\ info}$= 5.60 c. $M_{reduced\ info}$= 4.78 c. $M_{control\ group}$= 4.38; F [2, 262] = 19.64, $p < 0.001$).

6.3. Hypotheses testing

A series of ANOVAs were used with SPSS 27.0 to test the hypotheses. A first ANOVA compared the means of credibility and quality perceptions as well as purchase intentions across information support groups. The results reveal that respondents have a better perception of the quality ($M_{augmented\ reality}$= 5.63 c. M_{paper}= 4.78; F [2, 262] = 23.97, $p < 0.001$) (H1a) and the credibility ($M_{augmented\ reality}$= 5.73 c. M_{paper}= 5.01; F [2, 262] = 38.96, $p < 0.001$) (H1b) of the information about the ecolabel when AR presents it. The intention to buy the product is also higher when AR is the medium of information ($M_{augmented\ reality}$= 5.87 c. M_{paper}= 4.78; F [2, 262] = 56.82, $p < 0.001$) (H1c). Since the data is normally distributed (see Table 2) and independent, the residuals are normally distributed, and the variances of the sampled populations are equal, a series of Scheffé post hoc tests confirms that the means relating to the group exposed to information through AR differ significantly from those exposed to the paper version or the control group. These results validate H1, stipulating that information support affects the evaluation of the message and the intention to purchase. More specifically, H1a, H1b, and H1c are confirmed.

A second series of ANOVAs (SPSS 27.0) compared the means of credibility and quality perceptions as well as purchase intentions across information richness groups. It appears that the consumers surveyed have a more favorable perception of the quality ($M_{enriched}$= 5.67 vs. $M_{reduced}$= 4.78 vs. $M_{control}$= 4.51; F [2, 262] = 27.82, $p < 0.001$) (H2a) and credibility ($M_{enriched}$= 5.76 vs. $M_{reduced}$= 4.98 vs. $M_{control}$= 4.68; F [2, 262] = 43.76, $p < 0.001$) (H2b) of the information when it is enriched rather than reduced. Also,

the enrichment of information favorably influences purchase intention ($M_{enriched}$= 5.80 vs. $M_{reduced}$= 4.84 vs. $M_{control}$= 4.43; F [2, 262] = 46.46, p < 0.001) (H2c). Collectively, these results validate H2 by supporting H2a, H2b and H2c. Since the data are normally distributed (see Table 2) and independent, the residuals are normally distributed, and the variances of the sampled populations are equal, a series of Scheffé post hoc tests confirm the significant distinction between the means of the group exposed to enriched information and those of the group subjected to reduced information or the control group.

Finally, hypothesis H3 proposes testing the impact of the interaction between the information medium and the amount of information. We used two general linear models (GLMs), one for perceived information quality and the other for perceived information credibility (SPSS 27.0). The results showed a nonsignificant interaction effect on the evaluation of perceived quality (F[1, 253] = 0.24, p = 0.624) (H3a) and credibility (F[1, 253] = 2.30, p = 0.131) (H3b), leading to the rejection of H3a and H3b. Note, however, that in both cases (perceived quality and perceived credibility), the main effect of the amount of information is significant on perceived quality (F[1, 253] = 4.83, p < 0.05) and on perceived credibility (F[1, 253] = 11.73, p < 0.001). In contrast, the main effect of the information medium is insignificant in both cases. Since the interaction effect was not significant on either perceived information credibility or perceived information quality, we did not discuss the influence of the control variables. In sum, the amount of information, rather than its medium, seems to have a greater impact on the dependent variables of the study.

A third GLM revealed, however, a significant interaction (F[1, 253] = 11.73, p < 0.001) (H3c) in the prediction of purchase intentions while continuing to observe the main

effect of information medium (F[1, 253] = 112.11, $p < 0.001$) and that of the amount of information (F[1, 253] = 45.81, $p < 0.001$) on purchase intention (Figure 3). These results lead to the acceptance of H3c.

In both situations—reduced and enriched information—purchase intention is stronger regarding digital media based on AR technology (vs. paper media). On the other hand, it is interesting to observe that the transition from a situation of reduced information to a situation of detailed content has a stronger impact on purchase intention in the case of paper media. Bonferroni's post hoc test also validates the significance of these changes. The difference in purchase intention between reduced information and enhanced information is positive both for respondents subjected to AR (t [253] = 2.69, $p < 0.01$) and for respondents exposed to the paper version of the packaging (t [253] = 6.98, $p < 0.001$). This positive interaction is reinforced when respondents have a higher income (F[1, 253] = 4.23, $p < 0.05$), perceive the packaging as cool (perceived coolness) (F[1, 253] = 10.24, $p < 0.01$) and novel (F[1, 253] = 4.80, $p < 0.05$), have more experience with AR (F[1, 253] = 5.52, $p < 0.05$), perceive AR as complex (F[1, 253] = 8.19, $p < 0.01$) and are more involved with coffee (F[1, 253] = 30.69, $p < 0.001$). Figure 3 illustrates, more specifically, the differences in means between the groups. Respondents exposed to the enriched message they access through AR are the most likely to buy the ecolabelled product.

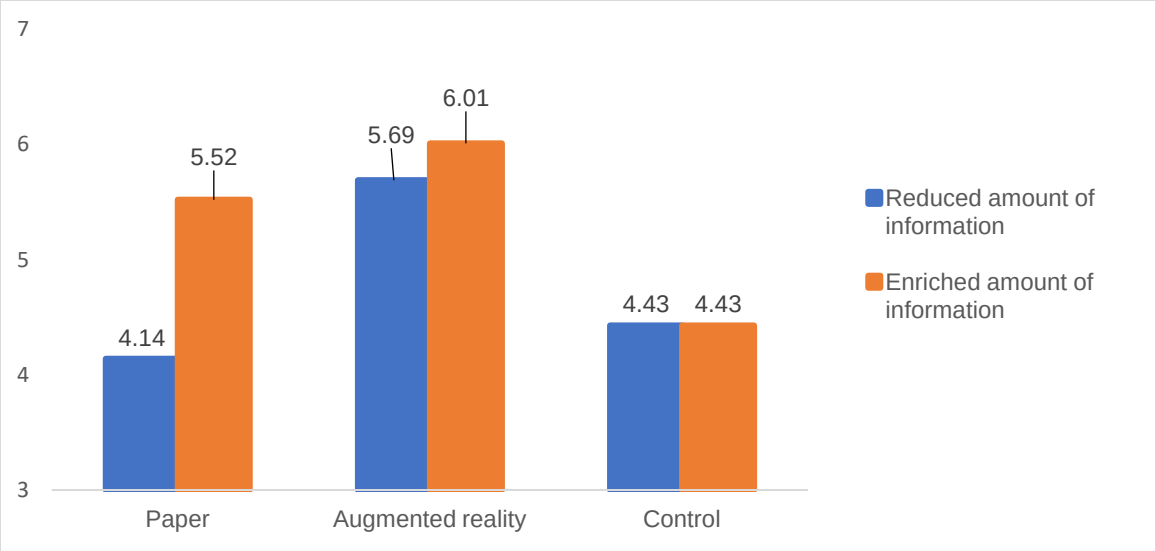


Figure 3. Purchase intention according to medium and amount of information

7. Discussion

Our research confirms that AR technology has a positive effect on the perceived quality and credibility of information around ecolabels, as well as on purchase intention. The positive effect of AR observed in the field of ecolabelling extends that observed in the distribution context and underlines the role of 4.0 technologies in influencing consumers' decision-making processes (Yim et al., 2017; Foroudi et al., 2018). Even if the Internet and 4.0 technology have contributed overall to intensifying informational content, sometimes making it challenging to identify the source of information and weakening its credibility (Sundar, 2008), consumers seem to attribute more credibility to the information associated with the digital medium (vs. paper medium) in the case of eco-friendly product labels. This result corroborates the publications (Elsbach & Stigliani, 2020), revealing that individuals tend to have relatively strong personal beliefs about new technologies (e.g., different, wonderful), which cause specific and unconscious biases in favor of new technologies to

the detriment of "older options." Given that the medium is the message (McLuhan, 1964), favorable biases toward the digital medium are transposed to the message it conveys so that this message is evaluated more favorably than if it had been communicated via other channels, such as paper medium.

Also, our study suggests the superiority of enriched information around the ecolabel compared to reduced information, illuminating the debate on the "optimal" amount of information and allowing better effectiveness of labels (Dekhili & Achabou, 2013). The current context of "infobesity," resulting in the scarcity of recipients' attention and the need to best distribute this attention among the multitude of information to which they are exposed (Carr, 2011), seems in favor of reduced and synthetic information. Furthermore, given the increased use of the Internet and other technological media, people have become accustomed to fast and disparate information (Carr, 2011). Also, it is commonly accepted that the assimilation of information is costly regarding time and cognitive effort and that digital overabundance could cause discomfort in individuals (De Vaujany and Mitev, 2015). However, the shortcomings of ecolabels in terms of observability and clarity of the signal's meaning from the consumers' point of view (Dekhili and Achabou, 2013) tend to impose the need for detailed information to help individuals evaluate eco-labeled products more thoroughly. Our result is in line with previous research that pointed to the need for consumers to be informed about ecolabelling programs and criteria (Ertz et al., 2017) and those that showed favorable effects when ecolabels were supplemented by other attributes, such as brand or country of origin (Dekhili & Achabou, 2015; Dekhili & Nguyen, 2021).

Moreover, the literature has raised the difficulty of ecolabels in reassuring consumers about the ecological quality of products, thus casting doubt on their

effectiveness. Our research, in line with O'Brien and Teisl's (2004) conclusions, seems to indicate that enriched information can help increase the credibility of ecolabels through an increase in the perceived quality and perceived credibility of the information around this signal. In short, it appears that a smart ecolabel, that is to say, a connected ecolabel, used interactively and offering the possibility of displaying detailed information, can constitute an alternative to the classic ecolabel and its shortcomings in terms of credibility.

The analysis of the effects of the interaction between the information medium and the level of enrichment of the content it offers confirms that the enriched information around the ecolabel favors a higher purchase intention in the case of the digital medium compared with the paper medium. This result is not surprising, given the possibilities offered by 4.0 technology in terms of data management. Moreover, the interaction effect is reinforced by consumers with higher income, who perceive the packaging as cool or novel, perceive AR as complex, have more experience with AR, and are more involved with coffee. Thus, even if there could be a novelty effect (Tsai et al., 2018), technology remains salient and positively influences behavior, even for consumers with more AR experience than the average. This result ultimately agrees with the findings of Shin et al. (2019) on the ability of users, who can thus be considered early adopters or more innovative, to remain committed to technology over the long term, especially after the peak of the novelty effect. These results also further validate Sundar's (2008) MAIN model as an appropriate framework for assessing the perceived quality and credibility of information in the case of signal effects transmitted by technological affordances—in this case, AR. The influence of income is expected, especially in the context of fair-trade products, which are often more expensive than non-fair-trade alternatives (Kameny, 2016). The lack of interaction of age

is surprising given the wide disparity in age among respondents, but this echoes previous findings (e.g., Pew Research Center, 2021) about the narrowing of the "tech gap" between generations, as smartphones, tablets, and social media use has grown significantly among older people. This is especially the case for consumers aged less than 75 years old, which is also the bulk of our sample and has accelerated with the COVID-19 pandemic (Nash, n.d.).

Nevertheless, in the case of paper packaging, we observed the strongest impact on the purchase intention of the passage from a reduced version of the information to a detailed version. It is undoubtedly less complicated to enrich the information thanks to AR technology than with classic paper packaging. However, especially in the latter case, there seems to be a particular interest in detailing the information because the gain in purchase intention is more substantial than the digital medium. Thus, contrary to what we might think, the enrichment of information should not be limited to digitized situations; the positive bias in favor of technology is also a double-edged sword because it can denote an impression of brilliance and superficiality, as suggested by some variables of the MAIN model (e.g., bells-and-whistles) (Sundar, 2008). In this sense, the absence of a need for cognition effect in the context of our study may mean that regardless of the medium (digital or paper), consumers expect to have detailed explanations about the ecolabel to understand its meaning, a key element in being able to mobilize this signal in the evaluation of products (Dekhili & Achabou, 2013).

8. Theoretical implications

By focusing on the effect of the richness of information on the evaluation of the messages conveyed around ecolabels and on the intention of behavior vis-à-vis ecological products,

this research responds to authors (Wedel et al., 2020) who called for going beyond the study of 4.0 technology as a peripheral element and to apprehend it more as a determining element of decision-making. More specifically, this research offers important contributions to the ecolabelling literature and marketing research on 4.0 technology (Ma & Sun, 2020).

First, by highlighting the positive impact of enriched information (vs. reduced information) around the ecolabel both on the perceived quality of the message, its perceived credibility, and the intention to purchase ecological products, we shed light on the determinants of the effectiveness of ecolabels (Dekhili & Achabou, 2015; Dekhili & Nguyen, 2021) and contribute to the debate on the issue of the amount of information to be provided to consumers in the case of eco-labeled products (O'Brien & Teisl, 2004). Furthermore, Ertz et al. (2017) highlighted that more elaborate information leads consumers to perceive better product quality and more credible environmental information. The present study corroborates this result regarding the positive influence of information quantity on consumer perceptions in the more specific case of a non-fictitious ecolabel and information on the signal coming from the certifying body itself.

In this sense, another notable theoretical contribution concerns the lack of effect of the need for cognition, making it possible to enrich the literature on this subject (Haugtvedt et al., 1992). Indeed, the case of eco-labeled products, with a multiplication of signals on the market and an ambient risk of greenwashing, seems to reinforce the need for information among all consumers.

Also, this research has established a significant interaction between the amount and the medium of information relating to the ecolabel. It appears, however, that the applications of AR, even if they seem to promote the intention to purchase ecolabelled

products, struggle to significantly influence the evaluation of the perceived quality and credibility of the information, making it possible to specify how 4.0 technology can promote ecological consumption.

Finally, by highlighting the positive impact of supporting mobilizing AR on purchase intention for eco-labeled products, we show the potential of 4.0 technology to strengthen ecological consumption. However, according to Foroudi et al. (2018), the changes in consumption dynamics triggered by 4.0 technologies are still far from fully clarified.

9. Managerial implications

At the managerial level, the results obtained suggest that information relating to ecolabels should be enriched; this criterion is particularly influential, probably more than the medium of the information. Some organizations have already taken the fold, such as the Quebec manufacturer of natural body care and household products ATTITUDE. Each of its products describes the ecolabels (e.g. Écologo) and their specific attributes. The company also publishes a detailed description of its certifications on its website. On the other hand, ATTITUDE does not link this digitized information to its packaging via QR code. It will be up to managers to determine if the few additional gains in terms of purchase intent are worth the investment in producing content accessible by AR.

Several considerations can guide these decisions. First, the lack of physical space on the packaging naturally leads to opting more for communicating the message in the form of AR. Similarly, other finer characteristics of the target could be collected beyond income. For example, it can be the perception of the complexity, novelty, or pleasant aspect

(perceived coolness) of AR and, more generally, to what extent the market presents a favorable bias (heuristic) toward the technology. Thus, storytelling in writing the description of the ecolabel can be particularly compelling (Belz & Peattie, 2012; Ertz, 2021). Furthermore, storytelling is likely to generate pleasure, favoring the perception of pleasant or new aspects, feelings that can both amplify the effectiveness of the enriched information combined with AR. Consequently, if the target displays the aforementioned characteristics, the investment would be profitable a priori to promote, at the very least, purchase intentions for ecolabelled products.

10. Limitations and future research avenues

This research is the first to examine the effectiveness of smart ecolabels with consumers. However, it is undoubtedly not free of limitations, which will allow us to consider several perspectives in the context of future research.

The first limitation is that only one category of products was tested. However, the challenges of ecolabelling can differ depending on the nature of the products and their degree of transformation. For example, coffee (raw product) is often linked to the challenge of fair trade, while cosmetic products are more associated with animal welfare and clothing due to the waste of resources and pollution. Also, certain categories of products (often food products) benefit from more ecolabels than others. Similarly, a single (committed) brand was considered in this research, while sustainable brand equity influenced the evaluation of ecological products and the credibility of the messages conveyed (Dekhili et al., 2021a). Thus, to reinforce the external validity of the research, it seems important to replicate the study by including other categories of products and brands with different degrees of commitment.

Moreover, in this research, we used a specific layer of AR, namely, the use of a QR code that consumers can activate to access detailed information. Mixed reality offers even more promising applications by superimposing virtual elements on the physical context (Rokhsaritalemi et al., 2020) (e.g., text, infographics, or an ecolabel information video). However, this presupposes the generalization of helmets or glasses dedicated to mixed reality. This is challenging as implementation barriers to 4.0 technology continue to exist (Balzarova et al., 2022).

Another limitation relates to the issue of the results' generalizability since the research was conducted in a specific context, that of Canada. However, countries' commitments to sustainability differ. Also, the regulations on ecolabelling and the diversity of ecolabels are not the same, depending on the cultural context (Dekhili et al., 2021b). Therefore, one promising line of research would be to consider countries characterized by a variety of ecolabelling policies and consumer ecological sensitivities. Furthermore, to reinforce the external validity of the research, we should go beyond the use of online surveys by reproducing the study in contexts closer to shopping experiences.

Besides, as the sample used is with a high proportion of men, future studies could also include more balanced samples in terms of gender.

In addition, while we controlled for awareness and knowledge about the specific ecolabel under study (i.e., Max Havelaar) and its use, we did not control for higher-order cognitions about environmental awareness or perceived environmental knowledge. This is also explicable because the ecolabel considered covered fair trade, a social rather than an environmental initiative; hence, the control for environmental awareness was of lesser relevance. Nevertheless, because both environmental and social dimensions form part of

the high-order sustainability construct, future research might also control for general environmental awareness. Likewise, although we indirectly assess consumer innovativeness with AR experience and attitude toward AR, both items infer rather than measure the degree of consumers' innovativeness, which could thus be measured more directly with dedicated constructs. Also, since we controlled for the ecolabel rather than the independent certification body, further studies could also consider that aspect. Finally, we used in this research the income variable as a proxy for price perception, although people with higher incomes might still perceive that the price point for the product is too high. It would thus be beneficial to consider the level of price perception to control for alternative reasons explaining different levels of purchase intentions besides the ecolabel format.

Appendix 1. Measurement scales

Variables	Scales	References
Perceived information quality	- Overall, I would give the information on the packaging high marks for the fair-trade coffee selection task. - Overall, I would give the information on the packaging a high rating in terms of quality for the fair-trade coffee selection task. - In general, the packaging provided me with high-quality information for the fair-trade coffee selection task.	Xu et al. (2013)
Perceived information credibility	- The information on the packaging is reliable. - The information on the packaging is trustworthy. - The information on the packaging is accurate. - The information on the packaging is believable. - The information on the packaging is valuable. - The information on the packaging is professional in content. - The information on the packaging demonstrates expertise in the subject matter. - The information on the packaging is informative. - The information on the packaging is authoritative.	Prendergast et al. (2009)

	- The information on the packaging is unbiased.	
Behavioral intention	- I intend to purchase the product from that brand. - My intention is to purchase that product instead of another product when purchasing coffee. - It is my intention to purchase the product from that brand.	Venkatesh & Davis (1996)
Perceived coolness	- This packaging is cool. - When I think of cool things, packaging like this comes to mind. - If I made a list of cool things, this packaging would be on it.	Sundar et al. (2014)
Perceived bells-and-whistles	- I find the packaging to be flashy. - I find the packaging is all flash but no substance. - I find the packaging is a hip thing with insufficient underlying content.	Sundar et al. (2014)
Perceived novelty	- I found using the smartphone to be a novel experience. - Using the smartphone is new and refreshing. - The smartphone represents a neat and novel way of obtaining information on ecolabels.	Wells et al. (2010)
Perceived intrusiveness	When the packaging was shown, I thought it was: - Distracting - Disturbing - Forced - Interfering - Intrusive - Invasive - Obtrusive	Hairong et al. (2002)
Attitude toward the augmented reality use	- I have fun interacting with augmented reality. - Using augmented reality provides me with a lot of enjoyment. - I enjoy using augmented reality. - Using augmented reality bores me (R).	Agarwal & Karashanna (2000)
Experience with augmented reality	- I have a great deal of experience using augmented reality. - Number of years using augmented reality.	Venkatesh & Davis (2000)
Voluntariness	- Using augmented reality is voluntary as far as work/school is concerned. - I am not required to use augmented reality for work/school. - While augmented reality enhances effectiveness in completing tasks, it is not required that I use it.	Venkatesh & Davis (2000)
Perceived complexity	- Using augmented reality can take up too much of my time when performing many tasks.	Igbaria et al. (1996)

	- When I use augmented reality, I find it difficult to integrate the results into my existing tasks. - Using augmented reality exposes me to the vulnerability of smartphone breakdowns and the unavailability of data.	
Cognition need	- I would prefer complex to simple problems - I like to have the responsibility of handling a situation that requires a lot of thinking. - Thinking is not my idea of fun (R). - I would rather do something that requires little thought than something that is sure to challenge my thinking abilities (R). - I really enjoy a task that involves coming up with new solutions to problems. - I would prefer a task that is intellectual, difficult and important to one that is somewhat important but does not require much thought.	Lins de Holanda Coelho et al. (2020)
Label knowledge	- I know Max Havelaar's label well.	Thøgersen et al. (2010)
Label use	- Usually, I take the Max Havelaar label into account when I shop.	Thøgersen et al. (2010)
Brand familiarity	-I'm familiar with the Ethical Bean brand.	David et al. (2005)
Product involvement (coffee)	- I would be interested in reading information about how coffee is made. - I would be interested in reading the Consumer Reports article about coffee. - I have compared coffee characteristics among brands. - I think there are a great deal of differences among coffee brands. - I have a most-preferred brand of coffee.	Zaichkowsky (1985)
Fair-trade concern	- Fair trade is important. - Fair trade ought to be a generalized way of trading (the benchmark) and not an alternative way (the exception). - I am concerned about the fair-trade issue.	De Pelsmacker & Janssens (2007)

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